Which start-ups achieve scale? Evidence from innovative start-ups in the EU and in the US

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The ability of innovative start-ups to scale is central to long-term productivity growth. This paper analyses scaling dynamics among start-ups founded between 2000 and 2025 in the European Union (EU) and the United States (US), using the OECD Start-ups Database. It distinguishes between growth-oriented firms (raising at least USD 50 million) and rising superstars (valuations above USD 1 billion). EU firms are less likely to become rising superstars and tend to scale later than US counterparts, with differences emerging mainly at advanced growth stages rather than at innovative entry. The gap appears linked less to inventive capacity than to the translation of innovation into commercial expansion, particularly through late-stage financing. Founder experience and early managerial professionalisation are strongly associated with scaling outcomes. The emergence of a first scaling event is followed by stage- and country-specific spillover patterns. Overall, scaling is a cumulative process shaped by financing depth, market integration and ecosystem connectivity.

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1 Introduction

1. The ability of innovative firms to scale is a cornerstone of long-term economic growth, industrial renewal and international competitiveness. Young, innovative companies – commonly referred to as start-ups – play a central role in this process. By introducing new products, processes, business models and organisational practices, start-ups often act as carriers of radical innovations and can catalyse the emergence of new markets and industries. While only a fraction of start-ups manages the transition from early experimentation to sustained high growth and scale, those that do can generate outsized economic impact, accelerating knowledge diffusion, intensifying competitive pressures, and supporting the reallocation of resources toward more productive uses. Reflecting these stakes, scale-up dynamics have moved to the forefront of policy debates across OECD economies; recent initiatives in some jurisdictions, including the European Union's 2025 Startup and Scaleup Strategy (2025[1]), underscore the renewed focus on removing barriers to growth, finance, and market expansion.

2. Previous research shows that high-growth innovative start-ups account for a disproportionate share of job creation and, in some geographies, the lion's share of R&D expenditure (Decker et al., 2014[2]; Gornall and Strebulaev, 2015[3]). Beyond these direct contributions, firms that successfully scale may also have important indirect effects on entrepreneurial ecosystems.[1] Within such ecosystems, high-growth innovative start-ups may generate knowledge spillovers through multiple channels, including the mobility of skilled employees, the creation of new entrepreneurial ventures by former founders or early employees, and dense interactions with suppliers, research organisations and complementary service providers. In addition, successful scale-ups may provide global visibility to emerging ecosystems, strengthening their ability to attract capital, talent and specialised services (Guzman et al., 2024[4]; Delgado, Porter and Stern, 2010[5]; Glaeser, Kerr and Ponzetto, 2010[6]; Spigel, 2017[7]; Samila and Sorenson, 2011[8]).

3. These ecosystem effects are particularly salient in digital and knowledge-intensive sectors, where strong network effects and "winner-takes-most" dynamics heighten the returns to rapid scaling. In these sectors, successful scale-ups can become central actors within entrepreneurial ecosystems, coordinating dense networks of users, suppliers, investors and complementary service providers. They may also help "anchor" emerging ecosystems by generating spillovers and intensifying interactions among local actors. When knowledge flows are strong and open innovation is prevalent, the linkages can reinforce geographical specialisation and stimulate further entry of innovative firms.

4. Against this backdrop, a large empirical literature shows that the economic contribution of entrepreneurship is highly skewed: only a small fraction of start-ups achieves sustained high growth. Yet, relatively little firm-level evidence systematically distinguishes start-ups that scale from those that do not across multiple structural dimensions. Existing studies tend to focus on individual mechanisms – finance, innovation, or talent – without integrating these factors within a unified framework or distinguishing between different stages of scaling. Understanding why some start-ups successfully

[1] An entrepreneurial ecosystem can be understood as a geographically bounded system of interdependent and co-evolving actors, including firms, investors, skilled workers, universities and support organisations, and the formal and informal institutions and networks that connect them, which together shape start-ups' access to knowledge, talent, finance and markets (Stam and van de Ven, 2019[69]; Spigel, 2017[7]).

transition into scale-ups while many others do not is central to current policy debates on innovation, entrepreneurship, and competitiveness.

5. This paper contributes to this discussion by providing a detailed firm-level analysis of start-ups that achieve significant scale. Using the OECD Start-ups Database (OSD), which integrates commercial start-up sources (Crunchbase and Dealroom) with patent, balance sheet, and M&A information from the OECD STI Microdata Lab, this paper makes two main contributions.

6. First, it operationalises scaling by identifying two empirically distinct categories of high-growth firms, recognising that the factors associated with early growth are not necessarily those that enable firms to complete the final transition to global scale. *Growth-oriented start-ups* are firms that have raised at least 50 million USD of funding, capturing ventures with demonstrated growth potential but not yet a large-scale market presence.[2] *Rising superstars* are start-ups that reach a valuation above 1 billion USD. This threshold may be achieved either while the start-up remains private (reaching the *unicorn* status) or at the time of an initial public offering (IPO). These two categories of start-ups – also jointly referred as scale-ups or successful start-ups throughout the paper – are compared to *other innovative start-ups,* defined as start-ups that have either filed for a patent or received investment from venture capital funds (VC-backed, henceforth). Each start-up is assigned to a single category, based on the highest scaling outcome achieved throughout the sample period; this categorisation is thus time-invariant. The goal of the analysis is indeed to provide a *static snapshot* of the characteristics that differentiate firms that scale from those that do not, and how these characteristics vary along the scaling stages (growth-oriented versus rising superstar).[3] Distinguishing between rising superstars and growth-oriented firms allows the analysis to separate early indicators of scaling potential from the factors that enable firms to transition into the most advanced stages of growth. This distinction is directly relevant for policy because constraints may bind at different points along the scaling journey, and factors associated with early growth are not necessarily those that support the last transition to becoming a rising superstar.

7. Second, the paper develops an integrated "multi-pillar" framework, mapping observable firm behaviour onto five key scaling dimensions identified in the EU Start-up and Scale-up Strategy (2025[1]) – regulation, finance, market access, talent and ecosystems. This approach enables a structured assessment of how different levers interact across stages of the scale-up process. The framework is applied to start-ups in the United States (US) and the European Union (EU), to understand whether firm's scaling characteristics differ across locations.[4]

8. By combining a stage-based approach with evidence across multiple mechanisms – including ecosystem "amplification" effects – the paper provides new micro-level evidence on where and why scaling frictions might emerge.

9. Despite their importance, the emergence of scale-ups has been uneven across economies over the past two decades. Scaling outcomes have been uneven across economies, with some locations generating larger cohorts of globally competitive firms than others. Using the data assembled for the paper (extensively described later), Figure 1.1 provides suggestive evidence of these differences

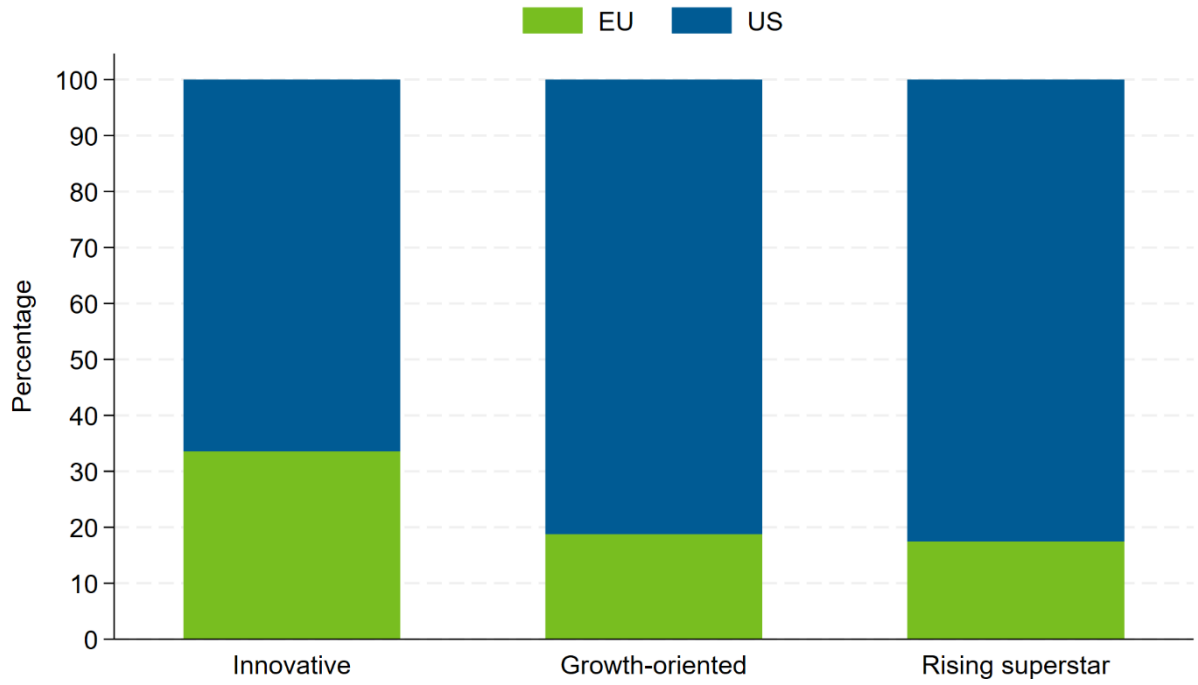
[2] These definitions reflect data availability: for private firms, direct indicators of revenue, employment, or productivity are often unavailable or inconsistently reported, whereas valuation and financing milestones provide observable, comparable markers of growth and anticipated performance (Bock and Hackober, 2020[46]).

[3] Note that this paper does not provide extensive evidence on a different and complementary analysis: characterise the pathway of start-up across types, from innovative, to growth-oriented, to eventually rising superstar. While highly relevant, this extension lies beyond the scope of the present paper and is left for future research.

[4] Along the text, start-up types refer to innovative, growth-oriented, and rising superstar categories. Country groups refer to the EU and the US.

(hereafter, the scale-up gap). The figure shows the relative importance of the EU and the US across the three categories of start-ups described above. While the US accounts for a larger share of start-ups in all three categories, its *relative importance* increases when moving from innovative start-ups to scale-ups (and only marginally when moving from growth-oriented to rising superstar). This pattern suggests that, although both country groups generate start-ups capable of scaling, the US is more effective at enabling firms to transition to the most advanced stages of growth. These differences have attracted increasing policy attention in Europe, which places closing the scale-up gap among its priorities (European Commission, 2025[1]).

Figure 1.1. Relative importance of start-ups' types across country groups



Note: This figure shows the percentage of start-ups categorised into three types: rising superstars, growth-oriented, and innovative, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars; finally, innovative start-ups are companies that have filed at least one patent or received VC funding. Bars sum to 100%. The sample includes start-ups founded between 2000 and 2025, consisting of 178 279 innovative start-ups, 11 230 growth-oriented start-ups, and 1 944 rising superstars.
Source: OECD Start-ups Database, June 2025.

10. As mentioned, the empirical analysis is structured around five key dimensions: regulation, finance, market access, talent and ecosystems. While similar pillars feature prominently in recent policy strategies (including in the EU), their use here is analytical: to relate each dimension to measurable firm-level behaviours and to assess how constraints differ by stage and location.

11. The first pillar concerns innovation-friendly regulatory environment. This pillar is examined through the lens of patenting activity, used in this context not as a measure of inventive performance per se, but as a proxy for the institutional and regulatory conditions shaping firms' incentives and ability to formalise, protect, and commercialise innovation. The results show that, while the EU exhibits strong inventive capacity among patenting start-ups, scale-ups in the EU are less likely to patent early in their life cycle. However, conditional on patenting, they tend to accumulate slightly more inventions before

scaling, but take longer to reach scale than their US counterparts. Taken together, these patterns provide suggestive evidence that the EU scale-up gap appears less driven by a lack of knowledge creation and more by frictions in the institutional and regulatory environment affecting the timing, protection, and commercialisation of innovation.

12. The second pillar relates to access to finance, a key enabler of rapid scaling, particularly at later stages when capital needs increase sharply. The analysis shows that early-stage financing trajectories are broadly similar in the EU and the US, suggesting that access to *initial* funding is not the primary constraint for European start-ups. However, funding paths diverge sharply at later stages for rising superstars. In the US, cumulative funding accelerates rapidly as firms begin to scale, consistent with deeper and more risk-tolerant late-stage capital markets. In contrast, EU scale-ups experience a marked slowdown in funding growth. Importantly, these differences are largely driven by a small number of US firms able to mobilise exceptionally large late-stage rounds and active in the ICT sector. Additional evidence on investor origin further highlights the role of globally connected investors. For example, EU start-ups that attract US investors at early stages are systematically more likely to scale and to do so faster. This pattern is consistent with the view that investors not only provide capital but also expertise, networks, and credibility that facilitate rapid scaling, highlighting the importance of globally integrated capital markets for overcoming late-stage financing constraints in Europe.

13. The third pillar focuses on market access and firms' ability to expand rapidly. The paper contributes by examining acquisitions explicitly as a scaling strategy for start-ups, a dimension underexplored in firm-level scale-up studies. Beyond organic expansion, acquisitions can provide a fast track to scale by enabling firms to enter new markets, broaden their technological scope, and acquire complementary capabilities. The importance of consolidation has also been emphasised in the Draghi report (2024[9]) as an important tool to compete in markets characterised by "winner-takes-most" dynamics. The analysis shows that acquisitions are a central channel of growth for rising superstars, particularly in sectors where speed, scope expansion, and access to complementary assets are critical. While acquisitions appear to be a central element of scaling strategies in both country groups, important differences emerge in their geography. In the US, acquisitions predominantly happen within the large and integrated domestic market. In the EU, by contrast, scale-ups rely more heavily on a mix of domestic, intra-EU, and extra-EU acquisitions. This is consistent with the view that in Europe acquisitions often serve as a mechanism to overcome market fragmentation and regulatory barriers, rather than purely as a strategy for scope expansion, pointing to incomplete market integration as a structural constraint on scaling.

14. The fourth pillar relates to access to entrepreneurial, managerial, and technical talent. The paper studies the association between founders' entrepreneurial experience and education, the arrival of external executives (notably CFOs), and scaling outcomes and speed. The results indicate that serial entrepreneurship and higher educational attainment among founders are associated with more frequent and faster transitions to scale-up status in both country groups. In addition, the hiring of external CFOs is strongly correlated with earlier scaling, underscoring the importance of specialised managerial capabilities in navigating complex financing, governance, and growth challenges. These findings confirm the idea that scaling depends not only on technology and capital, but also on firms' ability to professionalise management and access experienced talent at critical growth stages.

15. The fifth pillar relates to the role of entrepreneurial ecosystems. Ecosystems encompass a wide range of infrastructure, networks, and services, including access to finance, skilled labour, knowledge institutions, support organisations (such as accelerators and incubators), and market opportunities. In this sense, ecosystems both embed and amplify the mechanisms captured by the other pillars, while also exhibiting distinct features related to connectivity, spillovers, and cumulative dynamics. While the previous pillars focus on specific constraints, an ecosystem perspective captures how these elements,

together with additional ones, interact locally and whether the success of individual firms translates into broader and self-sustaining entrepreneurial dynamism.

16. To examine this pillar, the analysis adopts an ecosystem perspective based on Functional Urban Areas (FUAs), which provide an accurate representation of the environments in which firms interact, exchange knowledge, and access resources (Dijkstra, Poelman and Veneri, 2019[10]; Moreno-Monroy, Schiavina and Veneri, 2021[11]). The empirical question is whether the emergence of a successful start-up can act as a catalyst for local dynamism – for example, by generating knowledge spillovers, strengthening networks and entrepreneurial culture, and supporting the development of complementary institutions and services.

17. Using a staggered difference in differences strategy comparing FUAs producing their first rising superstar and growth-oriented start-ups to FUAs that will do so later, the analysis reveals distinct patterns across stages and country groups. In the EU, the emergence of a growth-oriented start-up is associated with subsequent increases in both overall and innovative (i.e. patenting) start-up formation within the ecosystem, whereas the appearance of a rising superstar does not generate comparable effects. This limited reaction following the emergence of a rising superstar might align with the evidence reported in previous pillars showing that EU rising superstars heavily depend on internationally integrated networks, therefore limiting the extent to which their success translates into local entrepreneurial dynamism. In contrast, in the US the emergence of a rising superstar is associated with stronger increases in innovative (patenting) start-up entry, whereas growth-oriented firms generate more modest spillovers. Given the depth, maturity and interconnectedness of the US entrepreneurial ecosystem, the emergence of a rising superstar – i.e. an *extremely successful* event – has a stronger ability to foster the environment. Importantly, across both country groups scaling events are also associated with increases in the inflow of VC capital activity, although the magnitude is stronger in EU countries. This might be related to the fact that EU capital markets are less developed, and the first rising superstar may serve as a strong signal that attracts more investment, both within and outside the EU.

18. Taken together, the event-study patterns are consistent with the idea that the first scaling event in an ecosystem can be followed by changes in local entrepreneurial activity. The analysis has shown that ecosystem responses to scaling events are not automatic: they depend on ecosystem depth and on the type of scaling event.

19. Table 1.1 provides a summary of the main results discussed in the paper across the different pillars, highlighting the differences across start-up types and discussing, whenever relevant, those across country groups.

20. Overall, consistent with the EU Start-up and Scale-up Strategy, the EU-US scale-up gap seems structural rather than sectoral in nature, reflecting the interaction of regulatory frictions affecting the formalisation and commercialisation of innovation, limited depth and risk tolerance of late-stage capital markets, persistent barriers to cross-border expansion within the Single Market, and weaker ecosystem-level amplification mechanisms.

21. Taken together, the findings show that scaling is a cumulative and selective process: firms progressively build the capabilities, resources, and organisational structures required to grow, and only those that can overcome multiple constraints at successive stages are able to scale successfully. Regulation, finance, market access, talent, and ecosystem conditions therefore interact over time in shaping both the likelihood and the speed of scaling.

Table 1.1 Summary of the main results

	Growth Oriented start-ups	Rising superstar
Pillar 1: innovation-friendly regulation	EU firms patent less frequently than US peers, but conditional on patenting, exhibit slightly more invention intensity.	Lower share of patenting firms in the EU than in the US. Conditional on patenting, invention stocks are similar across locations. EU firms patent earlier but take longer to scale after the first patent, suggesting slower translation from invention to scale.
Pillar 2: better finance for start-ups and scale-ups	Funding trajectories broadly similar across EU and US. Earlier scaling associated with the presence of multiple and international investors in the first deal.	US firms mobilise substantially larger late-stage funding. Divergence in funding trajectories emerges mainly at later stages and is driven by a small number of firms. EU firms rely more on internationally connected investors.
Pillar 3: fast market uptake and expansion	Acquisitions are used as a complementary growth strategy to achieve scaling. EU firms more likely to engage in cross-border acquisitions.	Acquisitions central to scaling strategy. More frequent in digitally intensive sectors and sectors characterised by high fixed costs. In the EU, acquisitions more often take place beyond domestic and intra-EU markets.
Pillar 4: support for the best talent	Serial founders and advanced education associated with higher likelihood and faster scaling. Appointment of an external CFO associated with earlier scaling.	Stronger prevalence of serial founders and more systematic professionalisation (external CFOs) prior to scaling Talent characteristics strongly correlated with scaling speed, especially in the EU.
Pillar 5: access to infrastructure, networks, and services	In the EU, the first growth-oriented firm is associated with subsequent increases in local formation of overall and innovative start-ups; more modest effects in the US.	In the US, first rising superstar associated with increased innovative entry; in the EU, limited spillovers to local start-up formation. Emergence of rising superstar is associated with increases in local VC inflows, especially in the EU.

Note: The table summarises the main findings of the paper, extensively described in Section 4. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars.
Source: Author's elaboration.

22. As a result, no single policy intervention can close the gap in isolation. Effective scale-up strategies should go beyond increasing start-up entry or supporting individual firms, and focus also on strengthening the conditions under which successful firms can grow, reallocate resources, and challenge incumbents. For Europe, this implies policy action across all pillars of the Strategy, with an explicit ecosystem perspective that recognises complementarities across policy domains. because constraints are persistent and multifaceted, there is no one-size-fits-all solution: improving late-stage

financing, reducing cross-border frictions, enhancing managerial mobility, and deepening local ecosystems are likely to be most effective when implemented jointly.

23. This paper proceeds as follows: Section 2 reviews the relevant literature; Section 3 describes the data used in the analysis; and Section 4 presents the profile of rising superstar start-ups and the scale-up gap across the EU and the US, following the pillars of the EU Start-up and Scale-up Strategy. Finally, Section 5 concludes.

2 Literature Review

24. A large and growing body of research shows that only a narrow subset of new ventures succeeds in achieving rapid and sustained growth, yet these firms play a disproportionate role in employment creation, productivity, and growth (Fritsch and Schroeter, 2010[12]; Henrekson and Johansson, 2009[13]; Haltiwanger, Jarmin and Miranda, 2013[14]).

25. Despite the central role played by high-growth firms, evidence on how start-ups transition into scale-ups – and on the constraints that shape this process – remains rare and uneven. In particular, relatively little firm-level evidence exists on how start-ups that eventually scale differ from other innovative start-ups along concrete dimensions related to innovation, financing, organisational choices, market expansion strategies, and local environments. Existing empirical evidence focus on specific mechanisms, but provide little integrated firm-level evidence comparing scaling and non-scaling ventures across these dimensions within a consistent empirical framework (Ewens and Marx, 2017[15]; Lee and Kim, 2024[16]; Hellmann and Puri, 2000[17]; Coviello et al., 2024[18]; Brown and Mawson, 2015[19]; Decker et al., 2014[2]; Gornall and Strebulaev, 2015[3]). As a result, it remains unclear which observable behaviours systematically distinguish firms that scale from those that do not, and whether similar patterns hold across institutional contexts. This paper contributes by providing harmonised firm-level evidence on a broad set of scaling-relevant dimensions, allowing a more integrated assessment of the mechanisms that distinguish firms that scale from those that do not.

26. Existing work emphasises that scale-ups are best understood as extreme tail outcomes, rather than as scaled up versions of typical young firms (Kerr, Nanda and Rhodes-Kropf, 2014[20]; Ewens, Nanda and Rhodes-Kropf, 2018[21]). Returns and valuation of start-ups are highly skewed, and the aggregate economic impact of entrepreneurship is driven by a small number of firms that receive very large investments and achieve exceptional growth trajectories (Gornall and Strebulaev, 2015[3]; Davydova et al., 2022[22]). From this perspective, differences in scaling performance across countries may reflect not average entrepreneurial conditions, but the ability of ecosystems to support rare, high-risk, high-reward growth paths.

27. This insight motivates treating rising superstars as a distinct category of firms, rather than conceptualising scaling as a smooth extension of early growth. Constraints to scaling are likely to be stage-specific: factors associated with early growth are not necessarily those that enable firms to complete the final transition to global scale. Access to finance illustrates this point clearly. While early-stage financing supports experimentation and initial market entry, late-stage financing must rise sharply to finance organisational scaling, market expansion, and strategic investments. At this stage, funding must be concentrated on a very small subset of firms with demonstrated growth potential. A growing body of literature emphasises that deep, coordinated and risk-tolerant late-stage venture capital markets are therefore essential for sustaining extreme growth trajectories (Aernoudt, 2017[23]; Duruflé, Hellmann and Wilson, 2018[24]; Fratto et al., 2024[25]). Empirical work shows that European firms face particular constraints particularly at this stage, reflecting fragmented capital markets, thinner late-stage investor networks and limited cross-border integration (Quas et al., 2022[26]; Arnold, Claveres and Frie, 2024[27]).

28. This paper contributes to this strand of literature by explicitly distinguishing scale-ups into growth-oriented start-ups and rising superstars. This distinction allows to assess whether constraints

differ along the scaling trajectories and whether bottlenecks emerge primarily in the at earlier stages or in the transition to extreme-upper -tail outcomes. By separating firms across the two scaling thresholds, the analysis sheds new insights on the firm's determinants of scaling and on the origins of Europe's scale-up gap.

29. Beyond firm-level characteristics, an extensive literature highlights the systemic nature of high-growth entrepreneurship and the role of entrepreneurial ecosystems. Entrepreneurial ecosystems – comprising individuals, organisations, institutions and networks – shape the resources, opportunities and constraints faced by start-ups, and their performance depends on complementarities across finance, skills, networks and institutional quality (Acs et al., 2018[28]; Guzman and Stern, 2020[29]).

30. A central idea in this literature is that scaling can generate cumulative advantages through knowledge spillovers, labour mobility, investor learning and reputation effects, reinforcing local dynamism over time (Xuan, Guo and Dai, 2025[30]; Audretsch and Feldman, 1996[31]; Guzman et al., 2024[4]; Delgado, Porter and Stern, 2010[5]; Glaeser, Kerr and Ponzetto, 2010[6]). Proximity to venture-backed or innovative firms increases the likelihood that new ventures obtain financing and achieve high-growth outcomes (Samila and Sorenson, 2011[8]; Chen et al., 2010[32]; Guzman, 2023[33]; Guzman and Stern, 2020[29]), while universities and research institutions further contribute to ecosystem depth by supplying skilled workers, generating scientific breakthroughs and sustaining channels of collaboration with industry (Audretsch, Leyden and Link, 2017[34]). In this perspective, ecosystem characteristics are not peripheral but constitutive of scaling itself, shaping both the opportunities available to firms and the speed at which they can mobilise the capabilities required to transition into high-growth trajectories. Yet, identifying whether superstar successes actively strengthen ecosystems, rather than simply occurring in already-dynamic places, remains empirically challenging.

31. In Europe, however, ecosystems are more fragmented geographically and institutionally. Although vibrant entrepreneurial hubs exist, the distribution of innovative activity is more dispersed, reducing the density of interactions that generate spillovers and potentially weakening cumulative scaling dynamics through more limited depth of local networks, reduced late-stage capital availability, and slower emergence of cumulative scaling dynamics (De Prato, Piroli and Nepelski, 2016[35]; Andrieu, 2011[36]). These structural differences raise important questions whether local successes, such as the emergence of a high-growth firm, translate into broader ecosystem strengthening in Europe.

32. This paper contributes to the ecosystem literature by examining whether the emergence of a first rising superstar or growth-oriented start-up acts as a catalyst for local entrepreneurial dynamism. By analysing how an initial high-growth success influences local ecosystems, the paper provides new evidence on the extent to which ecosystem conditions amplify the broader impact of individual firm success. Furthermore, by comparing these dynamics across the EU and the US, the paper links firm-level scaling outcomes with ecosystem-level responses within a unified empirical framework. This latter analysis highlights yet another dimension of the importance of the ecosystem, so far unexplored by the literature.

33. In summary, while the literature increasingly recognises that scaling is a tail phenomenon and that innovation, finance, talent, and ecosystems matter, there remains limited evidence that distinguishes scaling stages, compares EU and US mechanisms, and links firm-level success to ecosystem spillovers within one framework. This paper addresses these gaps by combining a stage-based typology (innovative, growth-oriented and rising superstars) with harmonised firm-level and ecosystem-level evidence in a comparative EU–US setting.

3 Data

34. This paper relies on different data sources which are harmonised and linked together by the OECD/STI Microdata Lab.

35. The primary data source is the OECD Start-ups Database (OSD), which provides information start-ups and on the broader entrepreneurial ecosystem. This database combines information from the commercial databases Crunchbase and Dealroom, considered by investors and analysts among the most comprehensive sources on start-up activity in the US and Europe, respectively. Data are collected from various sources like public news, company filings, domain and trade registries, and investor portfolios, among others. Crunchbase was founded in 2005 and Dealroom in 2013, but they contain retrospective information with a sufficiently large coverage from the early 2000s. These commercial datasets are combined, curated, cleaned, and harmonised by the OECD/STI Microdata Lab to create a unique and global micro-dataset covering nearly 4.5 million start-ups founded between 2000 and 2025. The construction of the OSD is documented in detail in Berger et al. (Forthcoming[37]), while in the present section, only the specific features of the OSD that are relevant for the empirical work conducted in this paper are described, namely: i) the subset of variables employed; ii) the sample construction and selection criteria; and iii) the additional classifications and linkages applied for the analysis.[5]

36. As introduced in Section 1, the analysis considers three different types of start-ups. Rising superstars include firms that have reached a valuation above one USD billion. This threshold may be achieved while the start-up remains private (reaching the *unicorn* status) or at the time of an initial public offering (IPO).[6] *Growth-oriented start-ups* are start-ups that have raised at least 50 million USD of any sort of funding, but that do not reach the rising superstar category.[7] Throughout the paper, the term scale-up refers to these two types of start-ups. The third category considered in this paper includes *innovative start-ups*, defined as start-ups that have either filed for a patent or are VC-backed.[8] Each start-up is assigned to a single category, based on the highest scaling outcome achieved throughout the sample period; this categorisation is thus time-invariant.

37. The idea of these firms' types is to cut the entrepreneurial activity into three categories: i) innovative start-ups, i.e. promising innovative start-ups which nevertheless have not yet shown strong growth potential, ii) growth-oriented start-ups, i.e. firms that have demonstrated strong growth potential

[5] Berger et al. (Forthcoming[37]) provides exhaustive documentation on the dataset's sources, construction and harmonisation procedures, linkage methodology, validation and benchmarking, as well as a full discussion of its scope, strengths and limitations. Readers are referred to that publication for complete details.

[6] The variable used to obtain companies' valuation is the post-money valuation available in Crunchbase and Dealroom. Such variables are the company value after a new investment round or IPO.

[7] This amount has been used in the literature as a threshold to identify start-ups with high scaling potential, which are on the path to becoming unicorns (Davydova et al., 2022[22]).

[8] These restrictions are imposed to narrow the sample to innovation-driven start-ups and avoid the inclusion of other entities included in the OSD, in line with extensive literature (Fons-Rosen, Roldán-Blanco and Schmitz, 2022[67]; Ederer and Pellegrino, 2023[68]; Berger et al., 2025[66]).

but have not yet completed the transition to large-scale market presence, iii) rising superstars, start-ups that have successfully crossed this final scaling threshold.

38. The final sample comprises more than 190 thousand start-ups founded between 2000 and 2025, including nearly two thousand rising superstars, around 11 thousand growth-oriented firms, and around 178 thousand innovative start-ups.[9]

39. The OSD provides a rich description of funding events at the deal level, which include information on the type of deal (e.g. private equity, grants, convertibles, debt, secondary markets, etc.), the date and the volume of the deal. In addition, it also contains detailed information on important actors within the entrepreneurial ecosystem, including start-ups' founders, employees, funding rounds, investors, and related entities, which is essential for several analyses in later sections. For founders, the database includes educational background, gender, and indicators of previous entrepreneurial experience. Employee-level information allows to identify non-founder executives, in particular external Chief Executive Officers (CEOs) and Chief Financial Officers (CFOs), along with the date of their arrival at the firm. Funding round information includes the amount, date, deal type, and all the investors in each deal. Investor-level information includes each investor's country of origin. Note that the coverage can vary substantially across different variables, and therefore, the subsequent analysis, depending on the variables considered, will be based on a different underlying sample.

40. Table 3.1 provides a comparative overview of start-up types in the EU and the US, showing substantial structural differences between the EU and the US across all stages of the entrepreneurial growth spectrum. The US hosts a larger number of rising superstars and growth-oriented start-ups vis-à-vis the EU: there are 1 586 rising superstars in the US compared with 358 in the EU, and 9 389 growth-oriented start-ups in the US against 1 841 in the EU. These firms also display higher rates of VC funding, patent ownership and advanced founder qualifications. Among rising superstars, US firms are more likely to hold patents (52% vs. 18%) and to have founders with graduate or doctoral degrees (54% vs. 41% for graduate founders; 74% vs. 42% for PhD founders), suggesting a stronger link between science-based entrepreneurship. Exit patterns also differ: IPOs represent a larger share of US rising superstars (34% vs. 29%), while unicorns account for a slightly higher proportion in the EU (64% vs. 58%), though absolute numbers remain much larger in the US.

41. Differences are also marked among growth-oriented and innovative start-ups. US growth-oriented firms exhibit higher IPO and acquisition rates (9% vs. 4% and 21% vs. 13%, respectively) and a stronger presence of serial and highly educated founders (39% vs. 33% serial founders; 60% vs. 34% PhD founders), pointing to a more experienced entrepreneurial base. Patent ownership is also substantially higher in the US for these firms (45% vs. 27%). Among innovative start-ups, the gap between country groups narrows in some dimensions – particularly VC participation (73% vs. 66%) – but the US still shows higher founder experience and education (20% vs. 16% serial founders; 36% vs. 21% PhD founders), while the EU records a slightly higher share of patenting (37% vs. 32%).

42. Overall, the evidence suggests that while both country groups generate innovative firms at scale, the US is more effective at translating early innovation into high-growth and large-scale entrepreneurial outcomes. The differences in these statistics, both across start-up types and across country groups, will be extensively explored in the next section, with the aim of characterising start-ups' types and how their characteristics differ across country groups.

[9] Just in one descriptive statistic, reported in Table 4.1, the sample considered includes also all other start-ups included in the OSD, which nevertheless are not included in any subsequent analysis, given the focus of the paper on innovation- and growth-oriented start-ups.

Table 3.1. Summary statistics for start-up types in the EU and in the US

	EU		US	
	Number	%	Number	%
	Rising superstars			
Number of start-ups	358	100.00	1,586	100.00
Unicorns	230	64.25	927	58.45
Initial Public Offering (IPO)	104	29.05	544	34.30
Acquired	24	6.70	115	7.25
Has VC funding	289	80.73	1,458	91.93
Has patents	66	18.44	817	51.51
Is an acquirer	99	27.65	461	29.07
Has founders' information	346	96.65	1,573	99.18
At least one female founder*	35	9.78	256	16.14
At least one founder is a serial founder*	147	41.06	850	53.59
At least one founder with a PhD degree*	56	15.64	321	20.24
	Growth-oriented			
Number of start-ups	1,841	100.00	9,389	100.00
Initial Public Offering (IPO)	73	3.97	834	8.88
Acquired	245	13.31	1,975	21.04
Has VC funding	1,520	82.56	8,431	89.80
Has patents	489	26.56	4,253	45.30
Is an acquirer	244	13.25	1,125	11.98
Has founders' information	1,743	94.68	9,050	96.39
At least one female founder*	187	10.16	1,330	14.17
At least one founder is a serial founder*	605	32.86	3,635	38.72
At least one founder with a PhD degree*	286	15.54	2,041	21.74
	Innovative			
Number of start-ups	59,820	100.00	118,459	100.00
Has VC funding	39,727	66.41	86,591	73.10
Has patents	22,362	37.38	37,350	31.53
Is an acquirer	1,728	2.89	4,080	3.44
Has founders' information	43,493	72.71	92,860	78.39
At least one female founder*	5,513	9.22	14,265	12.04
At least one founder is a serial founder*	9,738	16.28	24,114	20.36
At least one founder with a PhD degree*	4,567	7.63	8,288	7.00

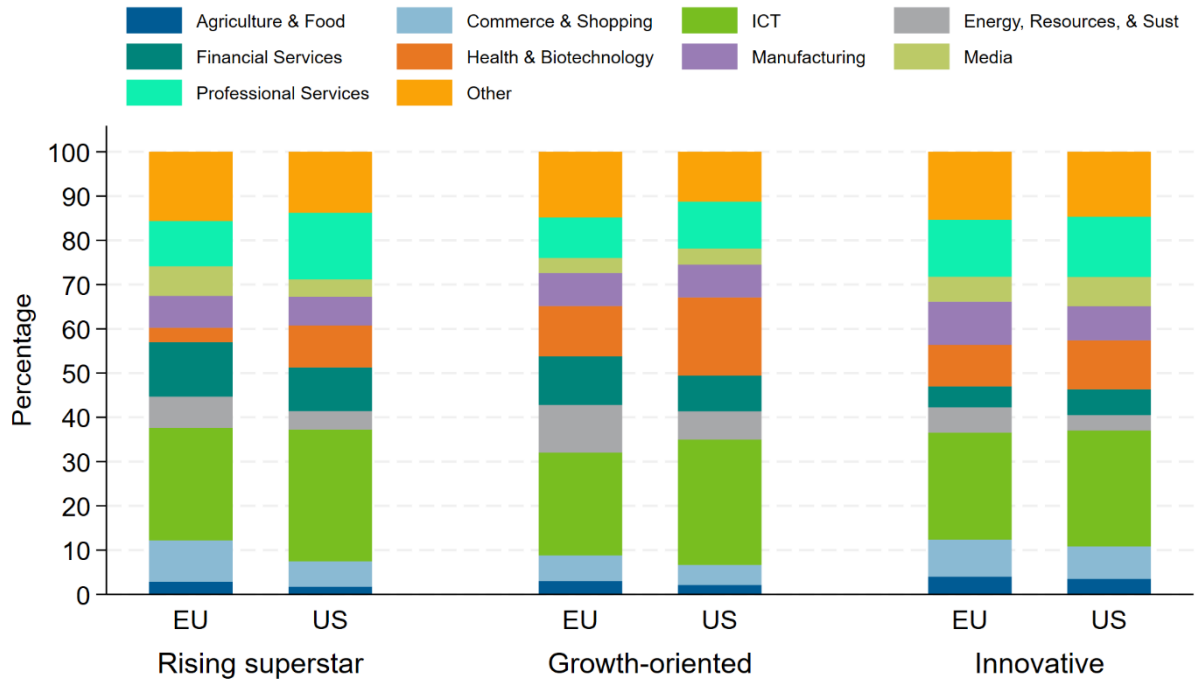
Note: This table presents the number and percentage share of start-ups founded between 2000 and 2025, categorised into three types: rising superstars, growth-oriented, and innovative, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars; finally, innovative start-ups are companies that have filed at least one patent or received VC funding. *The share of founders' related variables is calculated based on the total number of start-ups that have founders' information.
Source: OECD Start-ups Database, June 2025.

43. The OSD also provides information on the sector of activity of each start-up. The available sectoral classification does not follow the standard classifications of industrial activities developed by statistical offices; instead, it relies on descriptive tags assigned by Crunchbase and Dealroom based on a company's products, technologies, and business model. These tags are then aggregated by the OSD into broader sector categories that approximate conventional industry groupings. However, because firms typically receive multiple tags, individual start-ups can be associated with more than one sector.

44. Figure 3.1 summarises the sectoral distribution for the EU and the US start-ups. ICT-related activities make up the largest share across all three start-up types, reflecting the prominent role of digital

technologies in contemporary entrepreneurial activities. Health and Biotechnology, Professional Services, and Financial Services also account for sizeable shares among rising superstars in both country groups, underscoring the importance of knowledge-intensive and service-oriented activities. Importantly, the sectoral profiles appear broadly similar across country groups and start-up types, suggesting that the EU-US scale-up gap is unlikely to stem from differences in sectoral specialisation. Rather, the resemblance in sector composition points to the relevance of deeper structural, institutional, and ecosystem-related factors in explaining divergent scaling trajectories.

Figure 3.1. Sectoral composition of start-up types in the EU and in the US



Note: This figure shows the sectoral affiliation of start-ups founded between 2000 and 2025, categorised into three types: rising superstars, growth-oriented, and innovative, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars; finally, innovative start-ups are companies that have filed at least one patent or received VC funding. Sectors are not mutually exclusive: a start-up may be assigned to more than one sector based on its activities. Percentages are therefore calculated by weighting each start-up by the number of sectors it belongs to.
Source: OECD Start-ups Database, June 2025.

45. The OSD is complemented with several additional data sources compiled by the OECD/STI Microdata Lab. First, information on start-ups' inventive activities is obtained from the Worldwide Patent Statistical Database (PATSTAT), maintained by the European Patent Office. Because a single invention typically generates multiple patent filings across different jurisdictions, PATSTAT groups applications into DOCDB patent families to avoid double-counting and to ensure comparability across countries with different patenting regimes. Each invention is dated using the earliest filing year within its patent family.

46. For each start-up, the number of patent families in a given year defines the annual flow of inventions. These flows are standardised by patent office, WIPO class and filing year to account for differences in patenting propensities across technologies, countries and time. Flows are then cumulated

to construct a firm-level patent stock. Patent flows are retrieved from 1970 onwards and depreciated annually at a rate of 15%, yielding a harmonised measure of firms' inventive output over time.

47. Information on acquisition activity is sourced by Orbis M&A, part of Moody's Orbis. Previously known as Zephyr, this commercial dataset compiles information on M&A deals from media, press releases, financial reports, and administrative filings. It includes both domestic and cross-border M&As, covering deals involving target and acquiring firms across all industries. It offers global deal coverage from 2001, with European deals available from 1997. In this paper, acquisitions are defined as transactions in which the acquiror obtains more than a 50.01% stake in another firm. Linking Orbis M&A to the OSD enables access to detailed characteristics of both acquirers and targets.

48. Lastly, the analysis incorporates geographical information on Functional Urban Areas (FUAs), developed by the OECD and the European Commission (Dijkstra, Poelman and Veneri, 2019[10]; Moreno-Monroy, Schiavina and Veneri, 2021[11]). FUAs capture the functional footprint of cities by delineating a core commuting zone, thereby going beyond simple density or administrative boundaries. They consist of a core city and the surrounding, less densely populated municipalities that form part of the same labour market through commuting flows (OECD, 2012[38]; OECD/European Commission, 2020[39]). Schiavina et al. (2019[40]) provide a harmonised global database of FUAs, including detailed geographical boundaries. Using the latitude and longitude information in the OSD, each startup is assigned to its corresponding FUA. When precise coordinates are missing, location information (country, postal code and/or city) is used to impute geographic coordinates prior to FUA assignment. This matching enables the construction of a comprehensive FUA-year panel dataset, incorporating variables such as the total number of startups, the number of newly created start-ups, and yearly funding outcomes. Additional information for each FUA – including GDP, employment, and labour productivity – is obtained from the FUA-year level data provided by OECD (2026[41]). Measures of local research capacity are constructed using data from the Research Organization Registry (ROR), a global open registry that provides persistent identifiers and standardised metadata for research-performing organisations, including universities, public research institutes, government laboratories, hospitals, and other research facilities (Research Organization Registry, 2026[42]). ROR-linked institutions are aggregated at the FUA level to capture differences in the density and composition of local research infrastructures. This level of spatial aggregation allows a more accurate representation of the entrepreneurial ecosystems in which start-ups operate and better captures the geographical scope of most interactions within them.

4 The scale-up gap

49. Understanding why some start-ups successfully transition into scale-ups while many others do not is central to current policy debates on innovation, productivity, and competitiveness. While the scale-up gap between the EU and the US has been widely documented, far less is known about the firm-level characteristics, financing trajectories, and ecosystem conditions behind successful scaling (Arnold, Claveres and Frie, 2024[27]; Quas et al., 2022[26]; Duruflé, Hellmann and Wilson, 2018[24]). Addressing this gap requires moving beyond aggregate indicators to examine how start-ups grow over time, which constraints they face at different stages of their life cycle, and how these constraints interact with market structure and institutional environments. The empirical analysis that follows adopts this perspective by providing firm-level evidence on some important dimensions related to scaling.

50. As shown in Table 3.1, both the EU and the US generate start-ups capable of scaling. However, Table 4.1 shows that the distribution of start-up types differs markedly across the two country groups. The table covers four groups: rising superstars, growth-oriented start-ups, innovative start-ups, and "rest of start-ups" covered in the OSD. Examining all four categories provides an important first indication of where the EU–US scale-up gap emerges.

51. The "rest of start-ups" (those neither innovative nor on a scaling trajectory) represent the overwhelming majority in both the EU and the US. However, the remaining 12–13% of firms collectively account for around 80% of all start-up funding, underscoring that this upper segment of the distribution is where most resources flow and where the dynamics analysed in this paper are most economically relevant.[10]

52. Innovative start-ups account for a similar share of start-ups in the EU and the US (around 12%), and their funding shares are also comparable across country groups (around 10% in the EU and 8.5% in the US) and in line with the relative importance of this start-up type. Differences widen at the next stage. Growth-oriented start-ups are more prevalent in the US (0.99% of all start-ups) than in the EU (0.36%), and they account for a larger share of total funding in the US (39%) than in the EU (30%). Finally, rising superstars are rare everywhere, but significantly rarer in Europe (0.07% vs 0.17% in the US). Yet, despite their scarcity, they absorb a disproportionately large share of total funding: around 39% in the EU and 35% in the US.

53. Importantly, while relative comparisons based on shares are informative, absolute funding levels convey the scale of underlying differences in financing environments. The size of financing provided to US start-ups across the different types is systematically higher, pointing to different ecosystem capacities to support firms embarking on advanced growth trajectories.

[10] The "rest of start-ups" category is defined residually and comprises ventures that do not satisfy the valuation, equity-funding, or innovation criteria used to identify rising superstars, growth-oriented, or innovative start-ups. As reported in Table 4.1, this group of start-ups accounts for a non-negligible amount of funding, obtained in non-VC types of funding events (e.g. debt financing, post-IPO debt, private placements, or other hybrid instruments). In line with extensive literature (Fons-Rosen, Roldán-Blanco and Schmitz, 2022[67]; Ederer and Pellegrino, 2023[68]; Berger et al., 2025[66]), these types of deals have not been used to identify innovative start-ups.

54. Beyond reflecting differences in access to capital, observed funding levels might capture broader complementarities in the scaling environment, including legal and contractual infrastructure, managerial depth, and investor sophistication (Penrose, 2009[43]; Kerr, Nanda and Rhodes-Kropf, 2014[20]; Botelho, Fehder and Hochberg, 2021[44]). As such, financing outcomes provide a useful lens for assessing how effectively ecosystems transform financial inputs into scaling outcomes.

55. The patterns in Table 4.1 are consistent with differences in ecosystem conditions across the two country groups, a theme explored in greater detail in the subsequent analysis.

Table 4.1. Composition of start-up types and funding allocation in the EU and in the US

	EU				US			
	Number	%	Funding (bn USD)	%	Number	%	Funding (bn USD)	%
Rising superstar	358	0.07	476.81	39.24	1,586	0.17	1,675.70	34.92
Growth-oriented	1,841	0.36	367.17	30.22	9,389	0.99	1,886.62	39.32
Innovative	59,820	11.82	127.99	10.53	118,459	12.55	407.46	8.49
Rest of start-ups	444,066	87.75	243.07	20.01	814,495	86.29	828.78	17.27
Total	506,085	100.00	1,215.04	100.00	943,929	100.00	4,798.56	100.00

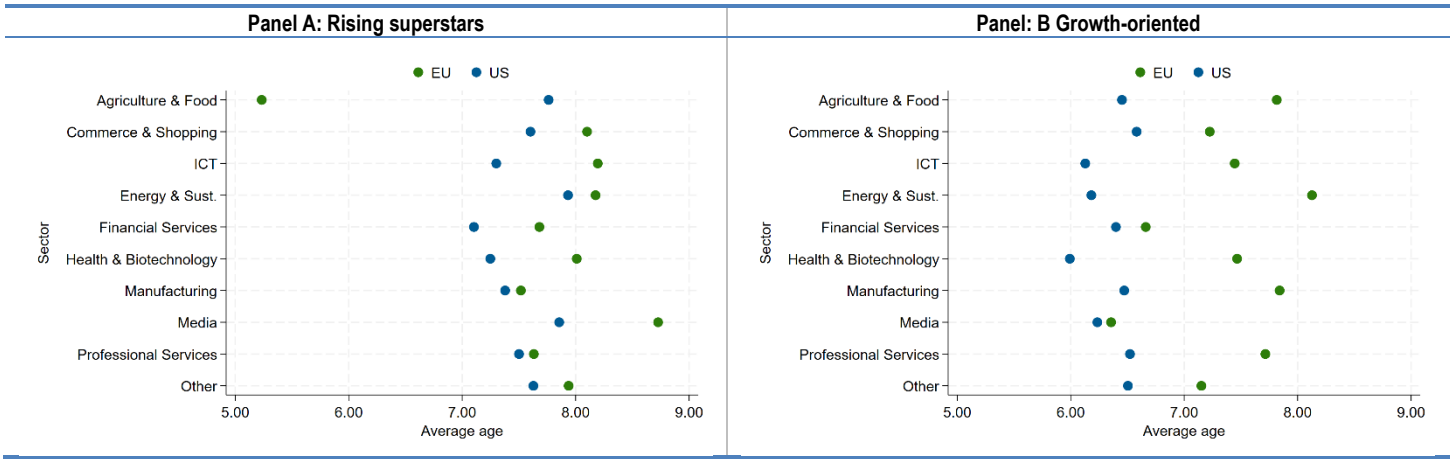
Note: This table reports the number and percentage share of start-ups founded between 2000 and 2025, categorised into four types: rising superstars, growth-oriented, innovative, and rest, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars; innovative start-ups are companies that have filed at least one patent or received VC funding; finally, the rest includes all start-ups that do not belong to the other categories. The percentage columns 2 and 6 indicate the proportion of start-ups within the location's total. The funding amounts are presented in billion USD. Columns 4 and 8 indicate the proportion of funding within each location.
Source: OECD Start-ups Database, June 2025.

56. Differences in the timing of scaling provide further insight and will be extensively investigated in the subsequent analysis. Age at scaling is an informative indicator because it captures both the duration required to mobilise resources and the cumulative burden associated with extended pre-scaling periods – such as regulatory compliance, workforce expansion, and repeated fundraising. Delayed scaling has important economic implications: it increases cumulative exposure to risk, raises financing needs over longer periods, and can weaken firms' ability to capture market opportunities in fast-moving and "winner-takes-most" environments (Ewens, Nanda and Rhodes-Kropf, 2018[21]; Duruflé, Hellmann and Wilson, 2018[24]; Somaya and You, 2024[45]; Bock and Hackober, 2020[46]). Differences in scaling speed, therefore, reflect not only firm capabilities, but also the effectiveness with which ecosystems transform innovative new activities into market expansion, making timing a critical dimension of the scale-up process rather than a purely descriptive outcome.

57. Data show that EU rising superstars typically scale about eight years after founding, compared to just over seven years in the US. Growth-oriented scale roughly one year earlier than rising superstars in both country groups. Median scaling ages are lower in both groups, showing right-skewed distributions where some companies scale significantly later. Although a one-year delay may seem modest in absolute terms, evidence shows that even differences of a few months can materially affect a start-up's ability to scale in fast-moving sectors, as venture capital accelerates commercialisation timelines (Hellmann and Puri, 2000[17]) and late-stage fundraising windows are highly time-sensitive (Duruflé, Hellmann and Wilson, 2018[24]).

58. Sectoral evidence reinforces the relevance of the timing gap. Figure 4.1 compares average scaling ages across sectors and country groups. EU rising superstars scale later than their US counterparts in most sectors, with the largest delays in sectors where speed of scaling is particularly important due to strong "winner-takes-most" dynamics, such as in ICT and Health & Biotechnology (Testa et al., 2022[47]). A wider delay is observed for growth-oriented start-ups between the EU and the US, with delays in most sectors exceeding one year. These sector-by-sector differences suggest that delays are not primarily driven by sectoral composition but rather reflect broader structural features that influence scaling dynamics across country groups. A plausible interpretation is that rising superstars, given their standout performance and clear market potential, are better able to overcome Europe's fragmented financing environment and secure the capital required to scale. By contrast, growth-oriented start-ups, which tend to progress more gradually and provide weaker early signals, may face greater difficulties unlocking the resources needed to accelerate, resulting in longer delays.

Figure 4.1. Sectoral distribution of start-ups' age at scaling in the EU and in the US



Note: This figure compares the average age at which rising superstars (Panel A) and growth-oriented (Panel B) start-ups scale-up. Rising superstars and growth-oriented, across two locations: the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025. Each point represents a sector–location pair (EU and US). The horizontal axis shows the average scale-up age. The "Other" sector category includes Education & Events, Community & Real Estate, Sports, Transportation, Travel, and miscellaneous sectors.
Source: OECD Start-ups Database, June 2025.

59. The remainder of this section examines how these differences in scaling outcomes and timing relate to the multidimensional nature of entrepreneurial environments. To do so, the analysis follows the five pillars of the EU Start-up and Scale-up Strategy: innovation-friendly regulation, better finance for start-ups and scale-ups, fast market uptake and expansion, support for the best talent, and access to infrastructure, networks, and services. This approach enables a systematic assessment of the structural and institutional conditions that shape scaling trajectories across the EU and the US (European Commission, 2025[1]).

Innovation-friendly regulation

60. Policy discussions across OECD economies increasingly emphasise that innovation-friendly regulatory and institutional settings influence the speed and cost at which firms can commercialise new technologies and scale across markets. Innovation-friendly regulation refers to the broader regulatory

and administrative conditions that enable innovative firms to thrive. A recurring policy concern is that fragmentation, administrative burdens and inconsistent rules can slow the transition from invention to scale, particularly in fast-moving markets with "winner-takes-most" dynamics , where delays in scaling can have persistent effects on market position (Testa et al., 2022[47]; Somaya and You, 2024[45]).

61. Among the regulatory levers shaping innovation-friendly environments, intellectual property (IP) systems, and patent protection more specifically, provide a particularly informative lens through which to examine this pillar. In this context, IP regimes illustrate how regulatory design can directly shape firms' ability to navigate market entry, protect their innovations and scale efficiently. Beyond capturing an output of the innovation activities (Basberg, 1987[48]), patenting is a formal legal process that entails fixed costs, procedural complexity, and enforcement uncertainty. For young and fast-growing firms, these features imply that patenting decisions reflect not only technological capability, but also the institutional environment in which firms operate (Squicciarini, Dernis and Criuscolo, 2013[49]).

62. In this subsection, therefore, patents are not used as a direct measure of regulation, but as an observable outcome that helps infer firms interact with innovation-related regulatory systems (notably those governing IP protection, enforcement and cross-border operations). Under this perspective, differences in patenting behaviour across locations can shed light on the broader regulatory conditions affecting scale-up dynamics, beyond differences in innovation capabilities. In fragmented regulatory settings, higher fixed or administrative costs of patenting may discourage some firms from engaging in formal IP protection, while concentrating patenting activity among a smaller subset of firms able to absorb these costs. At the same time, regulatory frictions may affect how quickly patented inventions can be translated into scalable commercial outcomes.

63. The analysis focuses on documenting systematic descriptive patterns consistent with the presence of regulatory frictions. It examines patenting behaviour along three complementary dimensions: i) the extensive margin of patenting (whether firms engage in patenting at all); ii) the intensive margin (the volume and quality of patented inventions among patenting firms); and iii) the timing between initial patenting and the attainment of the scale-up status. Together, these dimensions help for a structured assessment of how innovation-related regulation shapes firms' scaling trajectories in the EU and the US.

64. Table 3.1 highlights a clear difference between EU and US scale-ups at the extensive margin of patenting. Among EU rising superstars, only around 18.44% hold at least one patent, compared with around 50% in the US. A similar pattern emerges for growth-oriented start-ups, where EU start-ups are more likely to have a patent (26.56%), but still less likely than in the US (45.30%). This indicates that EU scale-ups are less likely to engage in formal IP protection prior to scaling. Importantly, a weaker extensive margin does not necessarily reflect lower innovative capacity. Rather, it may reflect differences in start-ups' propensity or incentives to formalise and protect their knowledge through patents. Factors such as higher fixed costs of patenting procedural complexity, or regulatory fragmentation across jurisdictions, may discourage broader engagement with the patent system among EU start-ups.

65. Among firms that do patent, EU scale-ups exhibit invention stocks that are comparable to – or higher than – those in the US. Table 4.2 shows that patenting EU rising superstars exhibit an average invention stock of 11.31 versus 10.42 in the US, and patenting EU growth-oriented firms show 11.14 versus 7.18 in the US. This combination of a weaker extensive margin but a stronger intensive margin is consistent with the view that the EU does not lack inventive capability among firms that patent. Rather, inventive activity appears concentrated in a smaller subset of patenting firms, while a broader group of scale-ups may be less likely to patent. This distinction might matter for interpreting EU-US differences in scaling trajectories, as it suggests that part of the gap may relate to how and when inventions are formalised, protected and leveraged during the scale-up process, rather than to invention itself.

Table 4.2. Distribution of pre-scaling patent stock among scale-ups in the EU and in the US

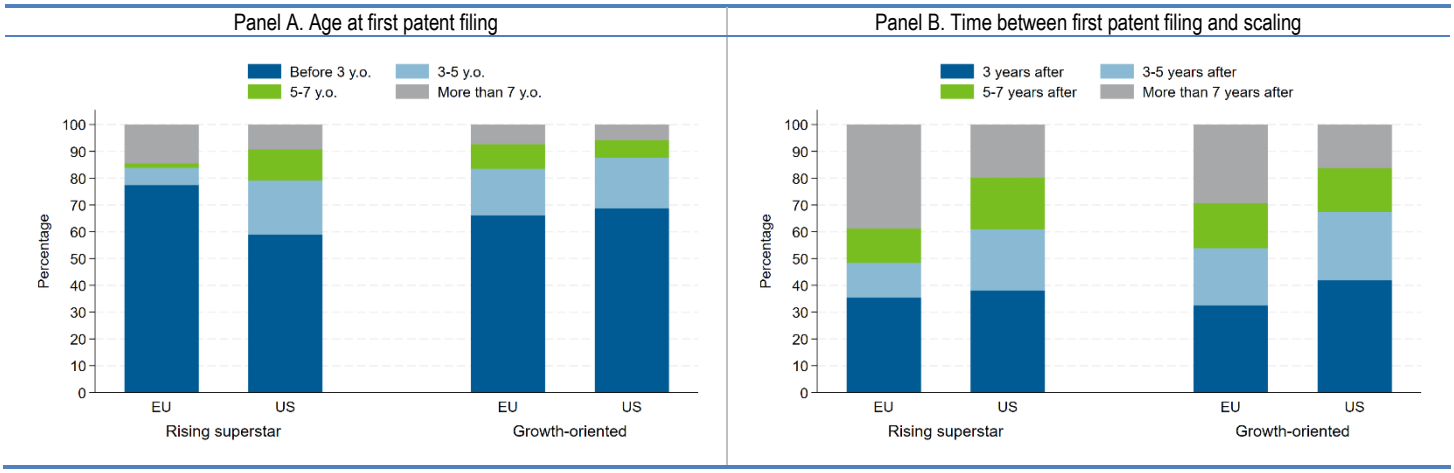
Rising superstar holding a patent					
	Number of start-ups	**Average n. of patents**	**P25**	**p50**	**P75**
EU	66	11.31	0.41	1.93	9.08
US	817	10.42	0.40	2.18	9.02
Growth-oriented holding a patent					
	Number of start-ups	**Average n. of patents**	**P25**	**p50**	**P75**
EU	489	11.14	0.93	3.95	10.26
US	4,253	7.18	0.49	2.54	7.97

Note: This table reports descriptive statistics on the invention stock accumulated by start-ups the year before their scale-up date. Start-ups are categorised into two types: rising superstars and growth-oriented, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025. Statistics include the number of start-ups, average patent stock, and selected percentiles (P25, P50, P75).
Source: OECD Start-ups Database, June 2025.

66. Figure 4.2, complements the extensive–intensive margin evidence by showing that EU–US differences also emerge in the timing of patenting and subsequent scaling. Among rising superstars, EU firms tend to file their first patent at younger ages than US firms (Panel A), but they take longer between first patenting and the scaling event (Panel B). For growth-oriented start-ups, the age at first patent is broadly similar across country groups, yet US firms reach the scaling threshold more quickly after patenting.

67. Taken together, the weaker extensive margin in the EU, alongside earlier and more intensive patenting among the subset of innovative firms, is consistent with a slower translation of formalised invention into commercial scale. While several mechanisms could underlie these differences – including variation in access to scale capital, market integration, as well as differences in organisational capabilities – the timing evidence points to the presence of specific frictions in the EU along the post-patent phase, such as the costs and complexity of multi-jurisdiction protection, enforcement and commercialisation processes, as well as firms' appropriation strategies. This pattern is consistent with bottlenecks in the translation of patented invention to rapid market expansion, rather than to a lack of inventive activity among patenting firms.

Figure 4.2. From patenting to scaling: timing of patenting and scaling in the EU and in the US



Note: The figure compares the age at which start-ups file their first patent and the time elapsed between first patent filing and the scaling event. Start-ups are categorised into two types: rising superstars and growth-oriented, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025. Bars represent shares across age intervals. Scaling age is the year in which a start-up becomes growth-oriented or a rising superstar.
Source: OECD Start-ups Database, June 2025.

68. To assess whether these timing differences persist when accounting for observable firm characteristics, the paper employs OLS regressions to provide more robust evidence on whether EU start-ups experience longer delays between invention and scaling than comparable US start-ups once additional firm-level controls are included. The baseline specification takes the form:

$$Y_i = EU_i^* \beta_1 + \ Rising\ Superstar_i^* \beta_2 + \ X_i' \beta_j + \delta_s + \gamma_c + \varepsilon_i,$$

Equation 1

where the key variable of interest is EU, which is a dummy variable indicating whether start-up i is headquartered in the EU (vs. the US), while Rising Superstar is a dummy identifying whether start-up i is a rising superstar (vs. Growth-oriented start-ups). Note that, given the exercise uses information on the timing of scaling, only scale-ups are included, and therefore innovative start-ups are excluded from the estimation sample. The dependent variable is the gap in years between a start-up's age at first patent filing and the age at which it attains scale-up status. A positive estimate of β_1 indicates that EU start-ups, on average, take longer to scale after first patenting, while a negative one indicates faster post-patent scaling. Stated differently, the EU coefficient captures the average difference in patent-to-scale delay between EU and US start-ups, comparing firms of the same scale-up type (growth-oriented vs rising superstar). The specification also comprises the vector of control variables X_i, which includes the citation-weighted patent stock accumulated before scaling, which helps distinguish differences in the quantity and quality of inventive activity. Sector and cohort fixed effects are also included, δ_s and γ_c respectively, to ensure that firms are compared within the same industry and founding year. This controls for sector-specific dynamics and for differences in macroeconomic or technological conditions prevailing at the time of entry. Robust standard errors re reported.

69. Table 4.3 presents the results. EU patenting start-ups exhibit a significantly longer patent-to-scale delay than comparable US start-ups: the EU coefficient is approximately +1.49 years. Conditional on patent quality, sectoral composition, and cohort, the EU coefficient captures the average EU–US difference across different types of scale-ups. The positive coefficient on the Rising Superstar indicator (+0.43 years) indicates that, conditional on controls, firms that reach the rising-superstar threshold tend to take slightly longer to scale after first patenting than those that reach the growth-oriented threshold. The set of controls and fixed effects ensure that the speed with which start-ups translate inventions into scalable business outcomes are not driven by underlying firm-specific inventive capacity, nor sectoral or cohort variations.[11]

Table 4.3. OLS regression results: time between first patent filing and scale-up

	(1)
Located in the EU	1.494***

[11] The same specification is also estimated introducing an interaction term between the EU and Rising Superstar dummies. These interactions are introduced to assess whether the timing gap is more or less important for different start-up types across country groups. This specification does not highlight any significant difference in the EU-US timing gap between Rising superstar and Growth-oriented.

	(0.194)
Rising superstar	0.425***
	(0.136)
log(1+Citations−weighted patent stock$_{t-1}$)	0.127
	(0.116)
Constant	6.832***
	(0.355)
Fixed effects	Cohort, Sector
Observations	3,524
R-squared	0.235

Note: This table shows results from ordinary least squares regressions from Equation 1, where the dependent variable is the difference in years between the age at the scaling event and the age at the first patent filing. Control variables include a dummy variable indicating whether the start-up is headquartered in the EU (vs. the US), a dummy identifying whether the start-up is a rising superstar (vs. growth-oriented), and the log of citations-weighted patent stock in the year prior to scaling. Control variables not shown in the table, but included, are fixed effects for cohort and sector. The sample includes start-ups founded between 2000 and 2025. Coefficients indicate how each variable affects age at scaling: a negative coefficient indicates earlier scaling, whereas a positive coefficient indicates later. Robust standard errors are in parentheses; significance: *p<10%, **p<5%, ***p< 1%.
Source: OECD Start-ups Database, June 2025.

70. These estimates should be interpreted as descriptive associations rather than causal effects. Nonetheless, they are consistent with the presence of frictions – especially in the EU – along the formalisation and commercialisation pathway, potentially including procedural complexity, fragmented protection/enforcement across jurisdictions, or other institutional and market factors, that shape the time required to convert patented invention into rapid commercial expansion.[12]

71. Taken together with earlier results showing strong invention intensity among EU firms that do patent, the evidence emerging from the regression supports the interpretation that differences in "time-to-scale" may relate to how and when inventions are formalised, protected, and leveraged, not only to knowledge creation per se. While this subsection focuses on IP institutions, similar frictions may arise in other domains relevant for scaling (e.g. product market regulation, data governance, licensing), reinforcing the importance of policies that reduce administrative burdens and improve predictability for firms seeking to expand across markets.

72. From a policy perspective, the results suggest that improving scale-up performance is not only about stimulating knowledge creation, but also about reducing frictions along the formalisation and commercialisation pipeline, including lowering administrative burden and delays associated with IP protection and related processes, and strengthening predictability and enforceability.

Better finance for start-ups and scale-ups

73. Access to finance is a fundamental determinant of a start-up's ability to scale. Beyond enabling firm entry, finance supports experimentation, product development, expansion into new markets, and organisational restructuring, all important steps for firms to achieve scale and growth. A broad literature emphasises that financing constraints are not confined to the earliest stages of firm development, but persist throughout the firm lifecycle, becoming particularly binding at later stages, when start-ups

[12] It is important to acknowledge that the observed differences in patenting behaviour and timing may also reflect variation in business models, financing strategies, or market structures across locations. For example, firms relying more heavily on trade secrets or platform-based models may patent less, while differences in VC practices may affect the timing of formal IP protection.

mobilise large, coordinated investments to sustain rapid expansion and compete at a global scale (Arnold, Claveres and Frie, 2024[27]; Quas et al., 2022[26]; Fratto et al., 2024[25]; European Commission, 2025[1]). In many settings, the key challenge is therefore less the availability of seed funding per se than the ability to assemble sufficiently deep and timely growth capital.

74. Although VC activity has increased markedly in recent years, inefficiencies and market failures remain, especially when capital markets and investor networks are fragmented. In the EU, these are closely linked to the fragmentation of capital markets across Member States and the limited development of pan-European investor networks. These structural features constrain the depth of venture capital and make it more difficult to assemble large investment rounds quickly, even for firms with strong growth prospects.Such fragmentation can limit the depth of the investor base, raise coordination costs, and make it more difficult to close large rounds quickly, with implications for both the likelihood of reaching scale and the speed at which scaling occurs (Hochberg, Ljungqvist and Lu, 2007[50]). Moreover, financing affects scaling not only through volume and timing, but also through its structure and investor characteristics: venture capital investors can provide governance, strategic guidance, credibility and access to networks alongside funding, and these non-financial inputs may become increasingly important as firms transition from early growth to global scaling (Engel and Keilbach, 2007[51]; Kaplan and Strömberg, 2001[52]; Bradley et al., 2019[53]).

75. This subsection provides new micro-level evidence on financing patterns across start-up types and country groups, and examines how investor characteristics relate to both scaling outcomes and the timing of scale-up. By providing novel insights on some important financing characteristics of scale-ups and differences across country groups, this analysis highlights the importance of several dimensions of the financing environment.

76. Consistent with widely documented aggregate patterns, Table 3.1 confirms a substantial funding gap between the EU and the US, with aggregate funding levels in the US approximately three to four times higher. While aggregate figures are important and convey the idea of a very different environment, they mask important heterogeneity across firm types and stages.

77. Figure 4.3 illustrates cumulative pre-scaling funding trajectories over time for rising superstars and growth-oriented start-ups. Several clear patterns emerge. During the first five years after founding, both the average and the median cumulative funding for EU rising superstars are broadly similar to that observed in the US. This suggests that access to early-stage financing is not markedly weaker in the EU on average, and that many high-potential start-ups are generally able to navigate initial growth phases.[13] Differences become more pronounced at later stages for rising superstars. In the US, average cumulative funding accelerates sharply beyond the early years, whereas in the EU the mean trajectory increases more gradually. This divergence is consistent with differences in the scale and depth of growth and late-stage financing, particularly in the capability to mobilise very large funding rounds for a small number of high-potential firms.[14]

78. The comparison between mean and median trajectories helps clarify where the divergence is concentrated. Median cumulative funding for rising superstars evolves more similarly across the EU and the US, while mean funding diverges substantially. This indicates that average gap emerges primarily in the upper tail of the distribution, i.e. a relatively small number of firms receiving exceptionally

[13] Cumulative funding is computed for age-specific cohorts of firms observed before scaling. Since the set of firms included can change with age, given that the sample retrieved in this exercise only includes start-ups *until* the age at which they scale), the sample average of cumulative funding is not mechanically monotonic and may occasionally decrease from one year of age to the next.

[14] These patterns should be interpreted descriptively: late-stage funding levels reflect the supply of capital but also the demand of capital, which is determined by several firm-level choices (e.g. fundraising strategy, timing of exits, or relocation)

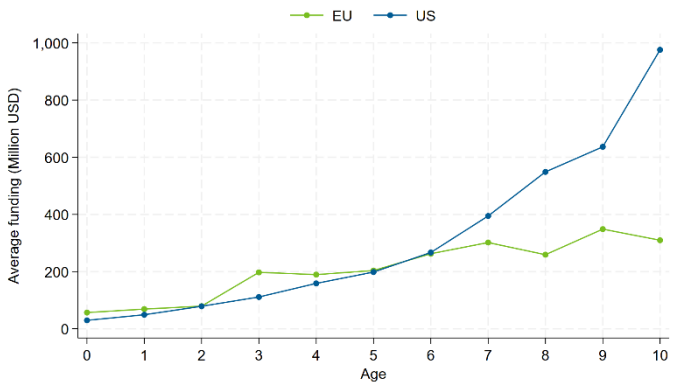
large funding rounds in the US, rather than by systematic differences for the "typical" firm in this category, hinting at the capacity of the US ecosystem to concentrate massive resources on a few firms deemed to have exceptional scaling potential. The EU ecosystem, conversely, supports a broader set of firms but lacks comparable ultra-deep financing at the top end.

79. For growth-oriented start-ups, funding trajectories are very similar across the EU and the US, and differences between mean and median outcomes are also smaller. This suggests that financing conditions for intermediate scaling paths are broadly comparable across the two country groups in this segment, with less evidence of a pronounced late-stage divergence than for rising superstars.

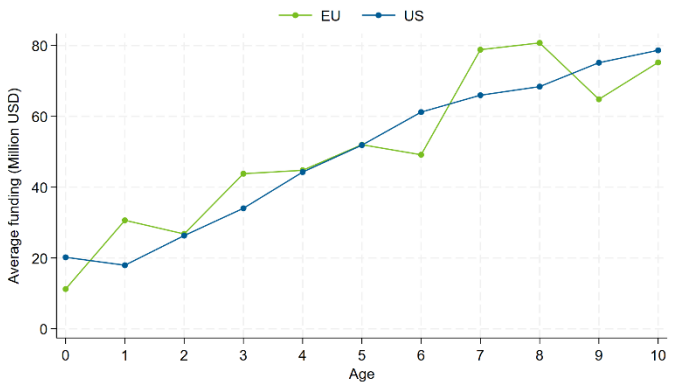
80. Taken together, these findings underscore that rising superstars and growth-oriented start-ups follow fundamentally different scaling and financing paths, with the former requiring substantially larger late-stage financing to support rapid expansion. The evidence suggests that the main cross-location difference lies in financing the extreme upper tail, particularly in capital-intensive scaling strategies, rather than in early-stage funding per se. The patterns suggest that Europe's financing ecosystem might be better equipped to support firms pursuing moderate or incremental scaling trajectories, but it may be less able to sustain firms developing radical and science-based technologies characterised by long development phases and high capital requirements. This interpretation is consistent with concerns about a European "middle-tech trap": concentration of capital might be particularly important in high-tech sectors characterised by "winner-takes-most" dynamics, where efficient scaling requires disproportionately large investments in a small number of high-potential firms. This discussion is corroborated by a sectoral breakdown of the evidence reported in Figure 4.3, showing that start-ups active in the ICT sector account for an important share of the late-stage funding divergence between country groups.[15]

Figure 4.3. Average pre-scaling cumulative funding by age in the EU and in the US

Panel A: Rising superstars - average



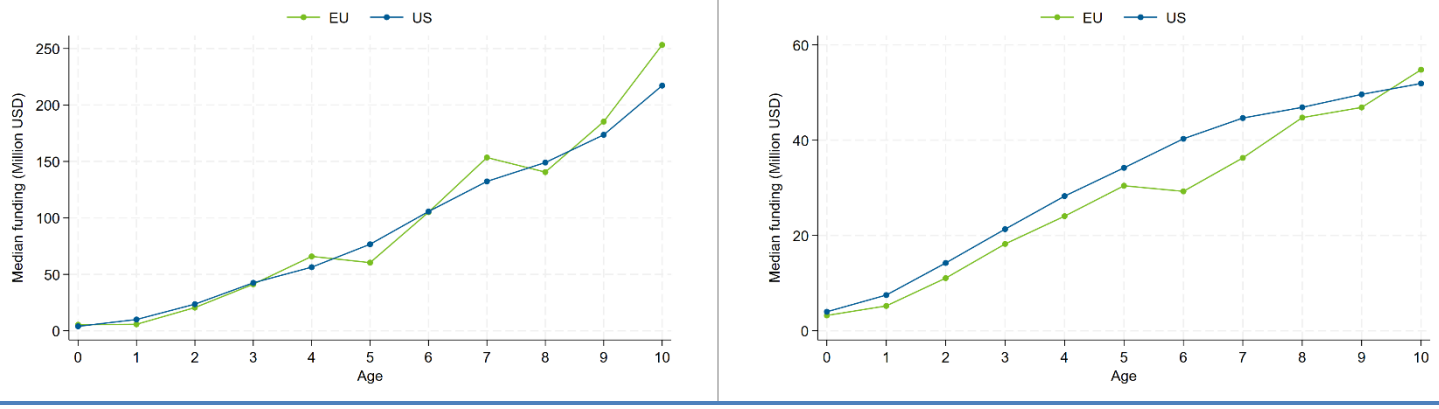
Panel B: Growth-oriented - average



Panel C: Rising superstars - median

Panel D: Growth-oriented - median

[15] The patterns are validated through regression analysis to determine if variations in funding are due to compositional factors or macroeconomic influences. Similar patterns emerge when cumulative funding is regressed on firm age dummies interacted with location (EU vs US), which provide the coefficients plotted in Figure A A.1 in Annex A. The regression also controls for year fixed effects to account for global trends and sector fixed effects, as sectors can differ markedly in their technological intensity, regulatory burden, and capital requirements. The results slightly differ from those reported in Panel A of Figure 4.3, as now the divergence in late-stage funding between the EU and the US rising superstars is less remarkable. This might suggest that sectoral specialisation of the US rising superstar in high-capital-intensive industries, i.e. ICT, can explain part of the patterns.



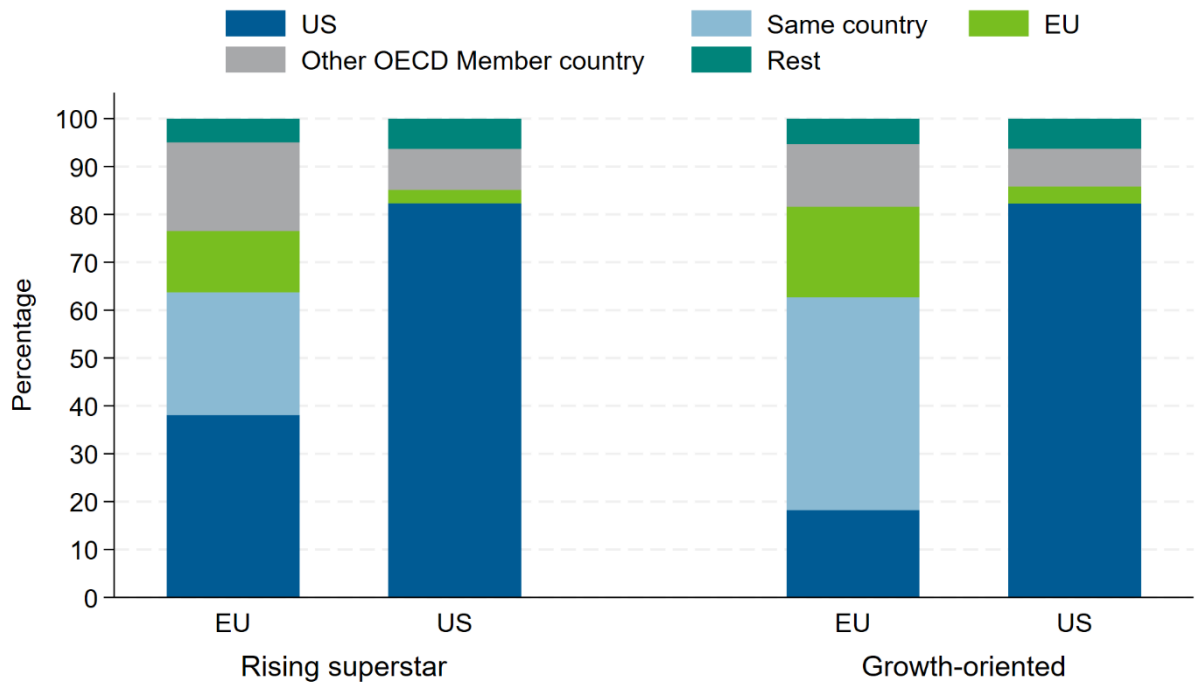
Note: This figure shows the evolution of average cumulative funding (in millions of USD) per start-up over its age (in years) for rising superstars (Panel A) and growth-oriented (Panel B) start-ups in the EU and the US. Panels C and D show the equivalent results for the median, respectively for rising superstars and growth-oriented start-ups. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025 and funding deals received before the start-ups scaled up. Funding amounts are reported in USD and adjusted using OECD PPP-based price level indices (US = 100) to account for cross-country differences in purchasing power.
Source: OECD Start-ups Database, June 2025; OECD Purchasing power parities database (2024[54]).

81. Beyond volumes of capital, recent policy discussions highlight the structure and origin of investor networks as key contributors to the scale-up gap. Investor characteristics can shape start-ups' access to follow-on funding, provide strategic guidance, and access to global networks, thereby influencing scaling pathways (Fratto et al., 2024[25]; Arnold, Claveres and Frie, 2024[27]; Duruflé, Hellmann and Wilson, 2018[24]).

82. Figure 4.4 provides direct evidence on the importance of these dimensions by showing the distribution of investors' origins across deals. Approximately 80% of funding received by US start-ups comes from domestic investors, and this pattern is broadly similar for rising superstars and growth-oriented start-ups. In contrast, EU start-ups exhibit a far more diversified funding structure. Although domestic investors represent the largest share of funding, their contribution is considerably lower than in the US (around 30%). If domestic and intra-EU investors are considered jointly (arguably the closest analogue to "domestic" funding in an integrated market), the EU picture becomes less stark, although cross-border EU investor participation remains more limited than might be expected. Notably, investor participation from non-EU OECD countries is relatively prominent compared with intra-EU participation. The relatively limited share of cross-border EU investment is consistent with persistent capital market fragmentation and the incomplete integration of European capital markets.

83. Differences also emerge across scale-up types within Europe. Rising superstars in the EU rely more heavily on US investors (around 40% of investors) than growth-oriented start-ups (around 20%). This does not imply that domestic or EU investors are unable to support scaling, since many firms reach the growth-oriented stage without heavy reliance on US investors. Rather, it suggests that US investors are more frequently involved at identifying and supporting the subset of EU firms with the highest potential to become global leaders. This motivates examining investor heterogeneity more directly, particularly the specific role of US investors relative to other foreign participants.

Figure 4.4. Distribution of investor types in start-up financing rounds in the EU and in the US



Note: This figure shows the percentage of investors by origin for start-ups categorised into two types: rising superstars and growth-oriented, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025 accounting for 9 171 start-ups, 13 844 investors in 25 869 deals, where only deals are included for growth-oriented and rising superstars before they scaled up. Investor origins are grouped into five categories: the US, the same country as the start-up, the EU, other OECD Member countries, and the rest of the world.
Source: OECD Start-ups Database, June 2025.

84. To assess the relationship between early investor characteristics and scaling outcomes, the analysis employs a multinomial logit model that estimates the probability that start-up i becomes i) a growth-oriented start-up or ii) a rising superstar, relative to remaining an innovative start-up. Let $Yi \in \{0,1,2\}$ denote the eventual scale-up status of start-up i, where 0 = innovative (baseline), 1 = growth-oriented, and 2 = rising superstar. The model is:

$$\Pr(Y_i = j | X_i) = \frac{\exp(X_i'\beta_j)}{1 + \sum_{k=1}^{2} \exp(X_i'\beta_k)}, \quad j = 1,2$$ **Equation 2**

where X_i includes characteristics of the firm's first financing deal – i.e. the presence of multiple investors, the presence of any foreign investor, the presence of a US investor, and deal volume – as well as sector and cohort fixed effects. The exercise focuses on the characteristics of the *first* financing deal (not considering subsequent rounds) both for conceptual and empirical considerations. Using all financing rounds prior to scaling would introduce a strong mechanical correlation with the definitions of rising superstar and growth-oriented start-ups, which rely on cumulative funding and valuation thresholds. Firms that eventually scale tend to complete more deals and raise substantially larger amounts, such that incorporating later rounds would risk near-perfect prediction of scale-up status, and raise endogeneity concerns. Moreover, investors participating in the first deal face the highest level of uncertainty, as relatively little information about the start-up's quality, technology, or market potential is

available at this stage (Botelho, Fehder and Hochberg, 2021[44]; Kerr, Nanda and Rhodes-Kropf, 2014[20]). Their identity, therefore, provides a more meaningful signal of early perceptions of firm potential, and of the initial networks to which the firm gains access. Restricting attention to the first deal also ensures comparability across start-ups, which differ in the number and timing of subsequent financing rounds. Raw coefficients in multinomial logit models are not directly interpretable; therefore, to ease the interpretation, results are presented graphically as average marginal effects (AME). An AME of 0.01 for rising superstars, for example, implies a one-percentage-point increase in the probability that a start-up becomes a rising superstar.

85. Figure 4.5 summarises the findings.[16] In Panel A, start-ups that have multiple investors in the first deal, meaning that their first funding round is syndicated, are significantly more likely to scale both in the US and in the EU. For growth-oriented the association is larger than for rising superstars, with an effect of six percent points for the US and 2.5 percentage points for the EU. Foreign investor participation shows a positive correlation with scaling, but only for EU start-ups.[17] This likely reflects structural differences across country groups: in deeper markets, such as the US one, early financing can often be sourced domestically, reducing the need for international investors at initial stages.

86. Panel B focuses on EU start-ups only, allowing a more detailed view of different types of foreign investors (distinguishing among investors from the EU, from the US, and from other non-EU countries).[18] The results show that participation by non-EU investors tends to raise the likelihood that an EU start-up scales. Among these, investors based in the US show the strongest association with scaling outcomes. As in the previous results, the association of these effects is higher for growth-oriented than for rising superstar. Part of this difference reflects the nature of the thresholds themselves used to define the start-up types. Reaching the growth-oriented threshold (raising USD 50 million) relates directly to funding inflows, while achieving the rising superstar status (a USD 1 billion valuation) depends also on market expectations, growth prospects, and other qualitative factors.

87. These estimates control for several important features of the first deal, including deal size, age at the time of the deal, the number of investors, and sector- and cohort-level fixed effects. This helps ensure that the observed association reflects not only differences in the capital availability, but also the value-added contributions that different investor groups bring, such as broader competencies and networks, or strategic support, that can facilitate more rapid scaling (Engel and Keilbach, 2007[51]). At the same time, they may also reflect investor selection patterns, whereby certain investors – especially those active internationally – tend to participate in start-ups that already display early signs of strong potential.

88. It is therefore important to emphasise that relationships documented are correlations, not causal effects. The results are consistent with both mechanisms operating simultaneously: investors may contribute to better scaling outcomes, and they may also be more likely to engage with start-ups that are already on promising trajectories.

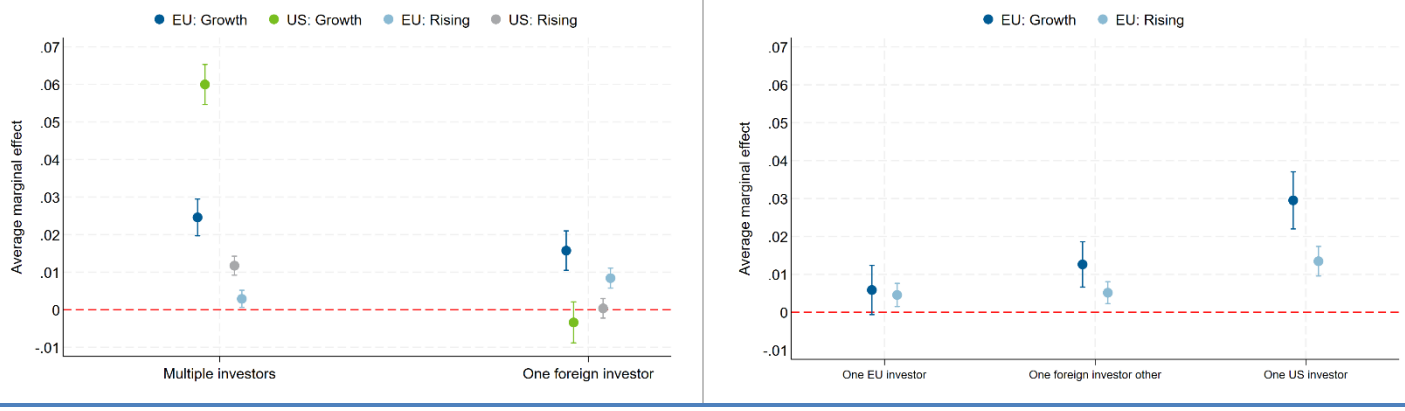
Figure 4.5. Investor characteristics and the probability of start-up scaling

Panel A: Full sample (EU and US start-ups)	Panel B: EU start-ups only

[16] The multinomial estimated coefficients are presented in Table A A.1 in Annex A.

[17] In Panel A, the variable “foreign investors” refer to investors outside of the EU for EU-based start-ups.

[18] Note that a round can involve investors from different countries, and therefore these categories are not mutually exclusive.



Note: The figure shows the average marginal effects from the multinomial logit regression in Equation 2, which dependent variable is the start-up's scaling outcome: innovative start-up (baseline), growth-oriented start-up, or rising superstar. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars; finally, innovative start-ups are companies that have filed at least one patent or received VC funding. The sample includes start-ups founded between 2000 and 2025. Control variables in Panel A include a dummy variable for whether the first deal involved multiple investors and a dummy variable for whether it involved at least one foreign investor (vs. only domestic investors; for EU start-ups, foreign refers to non-EU investors). Control variables in Panel B include a dummy variable for whether the first deal was syndicated (not shown) and dummy variables distinguishing investors from the EU, the US, and other non-EU countries. Control variables not shown in the figure but included are the first deal's volume, the start-up's age at the first deal, and fixed effects for cohort and sector. Funding amounts are reported in USD and adjusted using OECD PPP-based price level indices (US = 100) to account for cross-country differences in purchasing power. Points represent average marginal effects, and vertical bars denote 95% confidence intervals based on robust standard errors. A positive value indicates a higher probability of the corresponding scaling outcome relative to remaining an innovative start-up.
Source: OECD Start-ups Database, June 2025; OECD Purchasing power parities database (2024[54]).

89. Beyond scaling outcomes, the analysis also examines the relationship between investor characteristics and the *timing* of scaling using OLS regressions, following the same empirical specification as Equation 1. In this case, the dependent variable is the number of years from founding until the firm reaches scale-up status. The specification includes the same controls used in the multinomial logit: characteristics of the first financing deal, cohort and sector fixed effects. As discussed earlier, this kind of exercise, where the outcome is age at scaling, is necessarily conducted for firms that actually scale, meaning the sample is limited to rising superstars and growth-oriented firms. A negative coefficient implies a shorter founding-to-scale interval, meaning that firms with that characteristic reach scaling faster.

90. Table 4.4 reports the results. Column (1), which pools EU and US start-ups, shows that start-ups with multiple investors in their first deal scale significantly earlier (about one year earlier), suggesting that early exposure to a more diverse investor syndicate accelerates scaling. By contrast, the presence of at least one foreign investor is associated with later scaling, implying that foreign participation alone does not necessarily expedite the scale-up process.[19] Rising superstars scale later than growth-oriented start-ups, reflecting the more demanding trajectories required to reach advanced scaling outcomes. When the analysis is restricted to EU start-ups (Column 2) and distinguishing between investors from the EU, from the US, and from other non-EU countries, early access to EU and especially US investors is associated with significantly faster scaling. In contrast, the coefficients on other non-US foreign investors are small and statistically insignificant, suggesting that US investors

[19] As can be seen by comparing the coefficient on this variable in the baseline specification with the more disaggregated estimate reported in column 2 – which restricts the sample to EU scale-ups – the positive effect appears to be driven by US start-ups. Given the depth of US VC markets, most scale-ups are likely to obtain domestic financing. As a result, firms receiving foreign investment may represent a selected group that also scales at a later stage.

play a particularly important role in compressing the timeline to scale for EU start-ups. These timing effects are directly relevant for policy: longer pre-scaling periods increase financing needs and prolong exposure to uncertainty.

91. The same specifications are also estimated introducing an interaction term between the main variables of interests and the EU and Rising Superstar dummies. These interactions are included to assess whether the effects of key variables differ across start-up types across country groups. These alternative models yield similar results. No substantial differences emerge across start-up types, suggesting that the presence of multiple and foreign investors is similarly associated with faster scaling for both rising superstars and growth-oriented start-ups. Across country groups, the findings confirm the particularly important role of foreign investors in the EU. Importantly, the presence of multiple investors appears to accelerate the scaling process for EU rising superstars.[20]

Table 4.4. Investor characteristics and the age to scaling

	(1)	(2)
More than one investor in first deal	-1.051***	-0.615***
	(0.073)	(0.181)
At least one foreign investor in first deal	0.312***	
	(0.066)	
At least one EU (foreign) in first deal		-0.496**
		(0.238)
At least one foreign non-EU (excl. US) in first deal		-0.346
		(0.217)
At least one US (foreign) in first deal		-1.000***
		(0.223)
Rising superstar	1.085***	0.637***
	(0.083)	(0.196)
Located in the EU	1.091***	
	(0.090)	
Constant	9.968***	14.286***
	(0.234)	(0.738)
Fixed effects	Cohort, Sector	Cohort, Sector
EU sample only	No	Yes
Observations	9,171	1,480
R-squared	0.368	0.529

[20] The results including interaction terms are available upon request. To preserve clarity and readability, these results are not reported in tables given the large number of interaction terms.

Note: This table shows results from ordinary least squares regressions analogous to Equation 1, where the dependent variable is the age at scaling event (in years since founding). Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025. Control variables in both columns include a dummy indicating whether the start-up is a rising superstar (vs. growth-oriented), and a dummy variable for whether the first deal involved multiple investors. Control variables in Column (1) include a dummy variable indicating whether the start-up is headquartered in the EU (vs. the US) and a dummy variable for whether it involved at least one foreign investor (vs. only domestic investors; for EU start-ups, foreign refers to non-EU investors). Control variables in Column (2) include dummy variables distinguishing investors from the EU, the US, and other non-EU countries. Control variables not shown in the table, but included, are the first deal's volume and fixed effects for cohort and sector. Coefficients indicate how each variable affects age at scaling: a negative coefficient indicates earlier scaling, whereas a positive coefficient indicates later. Column (1) includes both growth-oriented and rising superstar start-ups in the EU and the US, while Column (2) only includes EU start-ups. Funding amounts are reported in USD and adjusted using OECD PPP-based price level indices to account for cross-country differences in purchasing power. Robust standard errors are in parentheses; significance: *p<10%, **p<5%, ***p<1%.
Source: OECD Start-ups Database, June 2025; OECD Purchasing power parities database (2024[54]).

92. Taken together, the analysis underscores that access to finance is not merely a source of capital, but a core component of the scale-up ecosystem that shapes firms' strategic choices, their pace of expansion, and ultimately their ability to compete globally. The EU–US gap documented here does not concern the *median* scale-up. Instead, it reflects the challenge of mobilising very large amounts of capital for the relatively small group of start-ups that pursue the most ambitious growth paths. The evidence suggests that Europe's financing environment is broadly effective at supporting early experimentation and moderate growth, but it remains less adapted to the financing needs of firms pursuing more radical innovation paths that require sustained, high-risk investment over long horizons.

93. Importantly, the role of finance extends beyond the volume of capital raised. Investor networks and expertise can influence governance, strategic direction, and international market access, all of which are critical for accelerating scale-up trajectories. In this respect, the prominence of internationally connected investors among Europe's most successful scale-ups highlights the importance of ecosystems that can combine deeper capital pools with experienced, globally connected investors.

94. From a policy perspective, these findings align with a broader set of OECD policy priorities aimed at improving late-stage financing conditions, increasing market integration, and reducing fragmentation across investment channels. Strengthening the depth, coordination, and international reach of venture and growth-equity markets is central to enabling more firms across member countries to scale rapidly and compete at the global frontier.

95. Overall, the results reinforce the importance of strengthening late-stage capital markets, deepening cross-border investment channels, and reducing fragmentation within scale-up financing ecosystems. Building such conditions is key to ensuring that a larger share of high-potential firms can progress from early promise to global scale.

Fast market uptake and expansion

96. Rapid market uptake and expansion are widely recognised as core ingredients of successful scaling, particularly in markets characterised by strong network effects and "winner-takes-most" dynamics. Firms that can quickly increase their customer base, broaden their offering, or secure footholds in key markets typically gain durable competitive advantages and shape long-run market structure. Policy frameworks, including the EU Start-up and Scale-up Strategy, therefore place emphasis on mechanisms that enable fast market expansion, such as better Single Market integration, access to public procurement, and collaboration with established firms.

97. This paper examines a complementary and understudied mechanism for fast market uptake: inorganic growth through acquisitions (Simon, 2016[55]). While much of the literature focuses on start-ups as acquisition targets, this analysis examines acquisitions initiated by start-ups themselves. This

perspective warrants attention precisely because it allows start-ups to scale faster than organic growth alone would permit. It is therefore particularly relevant for understanding advanced scaling strategies and carries distinct implications for competition policy.

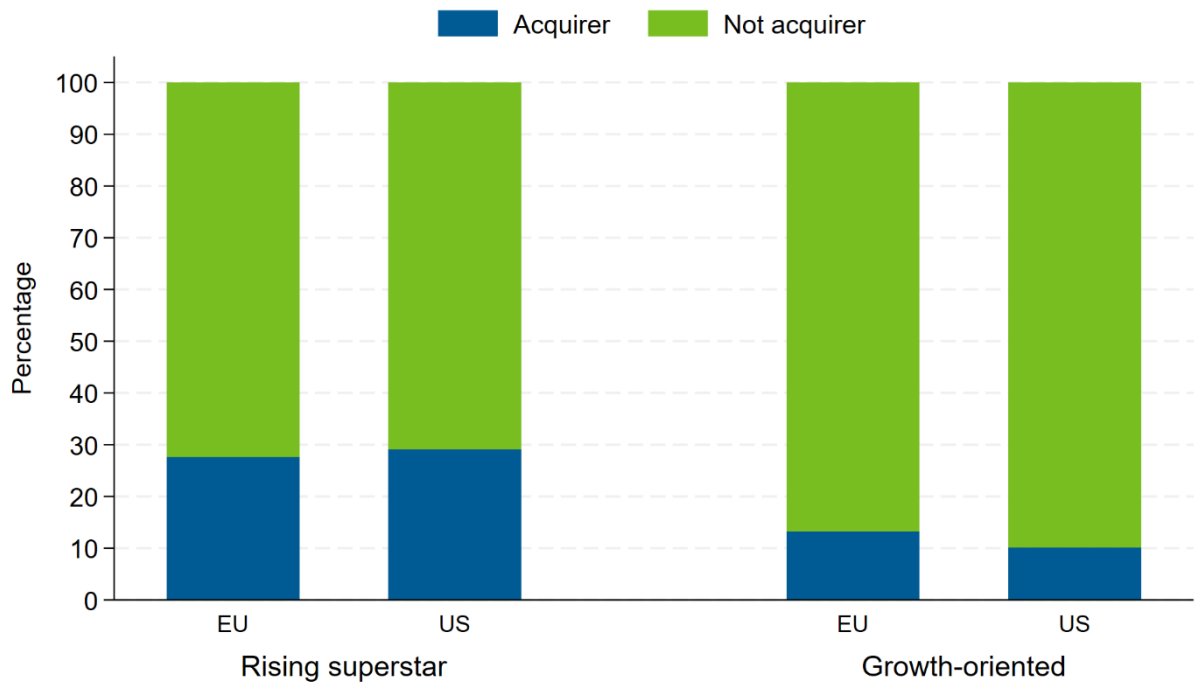
98. By acquiring other firms, start-ups can get direct access to capability development and geographical expansion, build complementarities that allow for the consolidation of technological advantages, and deepen organisational sophistication more rapidly than through organic growth alone. As highlighted in the literature, this form of expansion can be particularly important when scaling requires rapid access to talent, specialised knowledge, or complementary technologies (Testa et al., 2022[47]; Bock and Hackober, 2020[46]). The importance of consolidations as a means of growth has also been emphasised by Draghi (2024[9]), especially in markets with high sunk costs or digital-intensive business models, where scale can deliver substantial competitive advantages and where consolidation can be a natural feature of growth strategies.

99. Importantly, focusing on start-ups as acquirers (rather than as targets) fills a crucial gap in the evidence on scaling. Most research and policy discussions analyse acquisitions where start-ups are being bought, because these are a crucial exit strategy that stimulate entrepreneurial activity. Yet, for understanding how start-ups themselves scale, it is equally important to study cases where start-ups act as the acquiring firm.

100. This section examines acquisitions as a key channel of market uptake, and explores whether some differences in acquisition strategies might be related to the broader EU–US scale-up gap. Beyond providing a growth strategy, acquisitions are also indicative of ecosystem maturity. Engaging in acquisitions requires not only financial resources, but also managerial capacity, organisational maturity, and strategic ambition to coordinate complex integration processes. As such, acquisitions provide a useful lens for assessing both firms' ability to scale and the ecosystem conditions that support advanced growth strategies.

101. Descriptive evidence shows that acquisitions are a feature of scaling trajectories, particularly among rising superstars. Figure 4.6 shows the percentage of start-ups that have acquired at least one other company prior to achieving the scale-up status. Rising superstars are significantly more likely to undertake acquisitions than growth-oriented start-ups in both the EU and the US, suggesting that acquisitions are not isolated events, but are rather systematically associated with advanced stages of scaling. This relationship, however, does not imply a clear direction of causality: for example, high-growth firms close to becoming rising superstars may already possess the resources and capabilities needed to undertake acquisitions. Regardless of the underlying mechanism, the consistency across country groups in Figure 4.6 seems to suggest that acquisitions are a viable and recurrent tool used by scaling firms.

Figure 4.6. Percentage of start-ups acting as acquirers in the EU and in the US



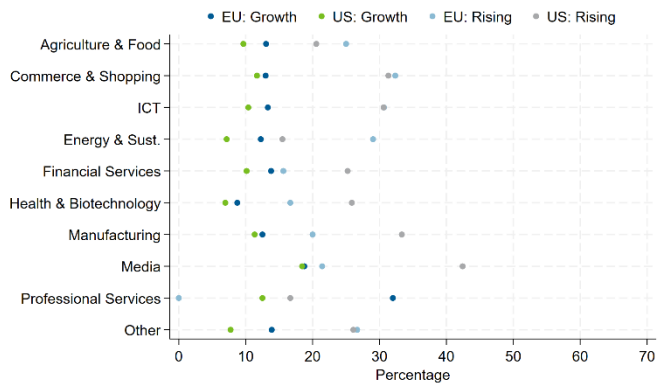
Note: This figure shows the percentage of start-ups that acquired at least one other company before they scale-up. Start-ups are categorised into two types: rising superstars and growth-oriented, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025.
Source: OECD Start-ups Database, June 2025.

102. Sectoral evidence provides further insight into the strategic role of acquisitions. Panel A of Figure 4.7 shows, by sector, the percentage of start-ups engaging in acquisitions by scale-up type. For example, approximately 30% of rising superstars in the EU and the US active in the ICT sector have been involved in an acquisition before reaching the superstar status. Acquisition activity is observed across all major sectors, but with substantial variation in intensity. In both the EU and the US, rising superstars consistently exhibit higher acquisition rates than growth-oriented start-ups in the same sector, reinforcing the idea that acquisitions are closely linked to the most advanced scaling trajectories rather than to sector-specific business models. Higher acquisition intensity in sectors such as ICT, commerce and shopping, and selected service activities is consistent with environments in which rapid capability accumulation, market positioning, and speed of expansion are particularly important.

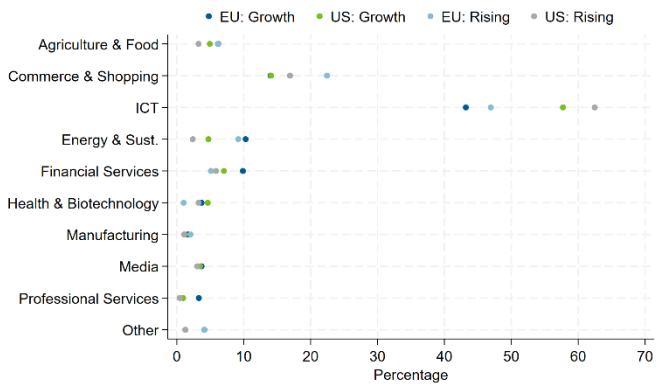
103. Panel B of Figure 4.7 focuses on scale-up that ever engaged in acquisitions and examines their sectoral composition. ICT start-ups account for the largest share in both the EU and the US, among both rising superstars and growth-oriented firms. This dominance extends beyond the high share of ICT firms among scale-ups, approximately 50% of acquisitions in ICT despite only 25% of the sample being active in this sector, as discussed in Figure 3.1, possibly reflecting that start-ups in these sectors are well-positioned to use acquisitions as a scaling instrument. Other sectors, such as commerce and shopping, financial services, and health and biotechnology, also contribute to acquisition activity, though to a lesser extent. The broadly similar sectoral compositions across country groups suggest the central role of acquisitions within the digital economy's scaling processes.

Figure 4.7. Pre-scaling acquisition intensity and sectoral distribution of acquiring scale-ups in the EU and in the US

Panel A: Share of scale-ups engaging in acquisitions



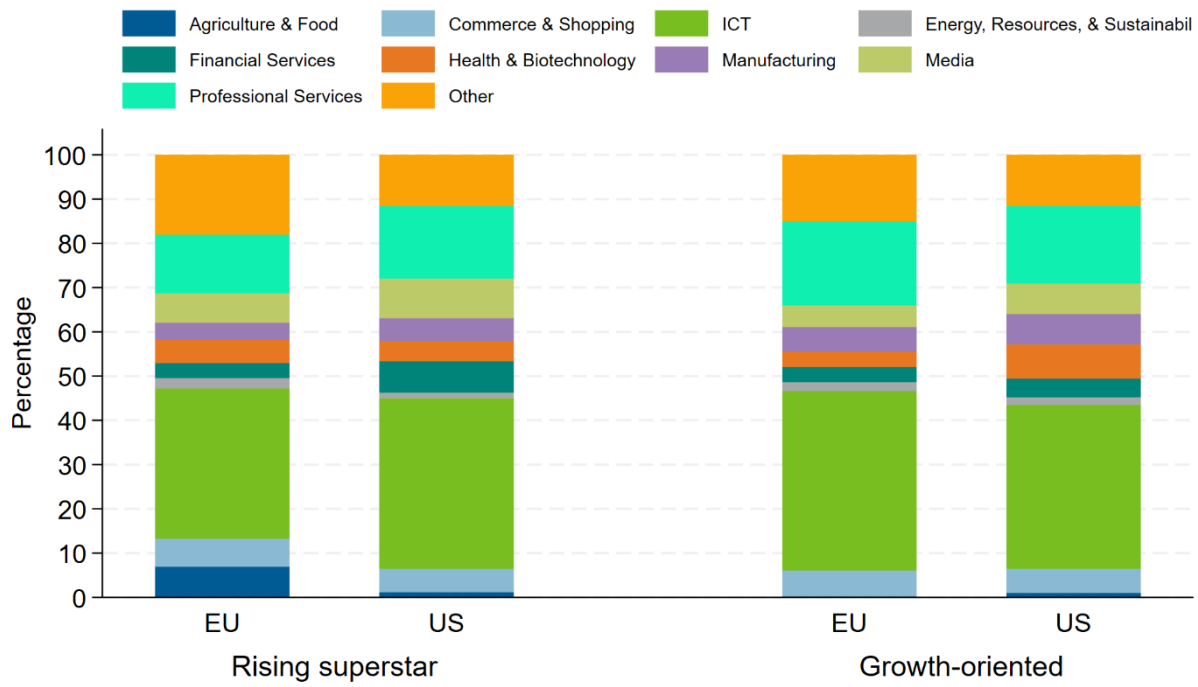
Panel B: Sectoral composition of acquiring scale-ups



Note: This figure shows sectoral patterns of acquisition activity among scaling start-ups for those acquisitions before the scaling event. Start-ups are categorised into two types: rising superstars and growth-oriented, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025. Panel A reports, for each sector and country group, the percentage of scale-ups that completed at least one acquisition, separately for growth-oriented start-ups and rising superstars. Panel B reports the sectoral distribution of scale-ups that undertook at least one acquisition, showing the share of acquiring firms by sector. Sectors with a small number of observed transactions may display higher volatility in acquisition rates, such as Manufacturing, Media, and Professional Services. The "Other" sector category includes Education & Events, Community & Real Estate, Sports, Transportation, Travel, and miscellaneous sectors.
Source: OECD Start-ups Database, June 2025.

104. Zooming in into the ICT sector, the sectoral distribution of target firms sheds further light on the nature of these acquisitions. Figure 4.8 shows the sectoral distribution of acquired firms in transactions where the acquiror is an ICT scaling start-up. While ICT firms frequently acquire other ICT firms (40%), a substantial share of targets lies outside the acquirer's core sector, suggesting that acquisitions are not primarily used for within-technology consolidation. Instead, acquisitions might often serve broader expansion and complementarity objectives, such as accessing adjacent capabilities, expanding service offerings, or strengthening organisational and operational capacity. This interpretation is reinforced by the high presence of professional services and other non-ICT targets, pointing to acquisitions as a mechanism for building integrated and scalable business models rather than narrowly deepening technological specialisation.

Figure 4.8. Sectoral distribution of targets acquired by ICT scale-ups in the EU and in the US



Note: This figure shows the sectoral distribution of target firms in acquisition transactions involving scaling start-ups. Acquirer start-ups are categorised into two types: rising superstars and growth-oriented, across two location,: the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes 6 812 targets of ICT acquirer start-ups founded between 2000 and 2025 that acquired another firm before their scaling event. Percentages sum to 100 within each country group and start-up type. The "Other" sector category includes Education & Events, Community & Real Estate, Sports, Transportation, Travel, and miscellaneous sectors.
Source: OECD Start-ups Database, June 2025.

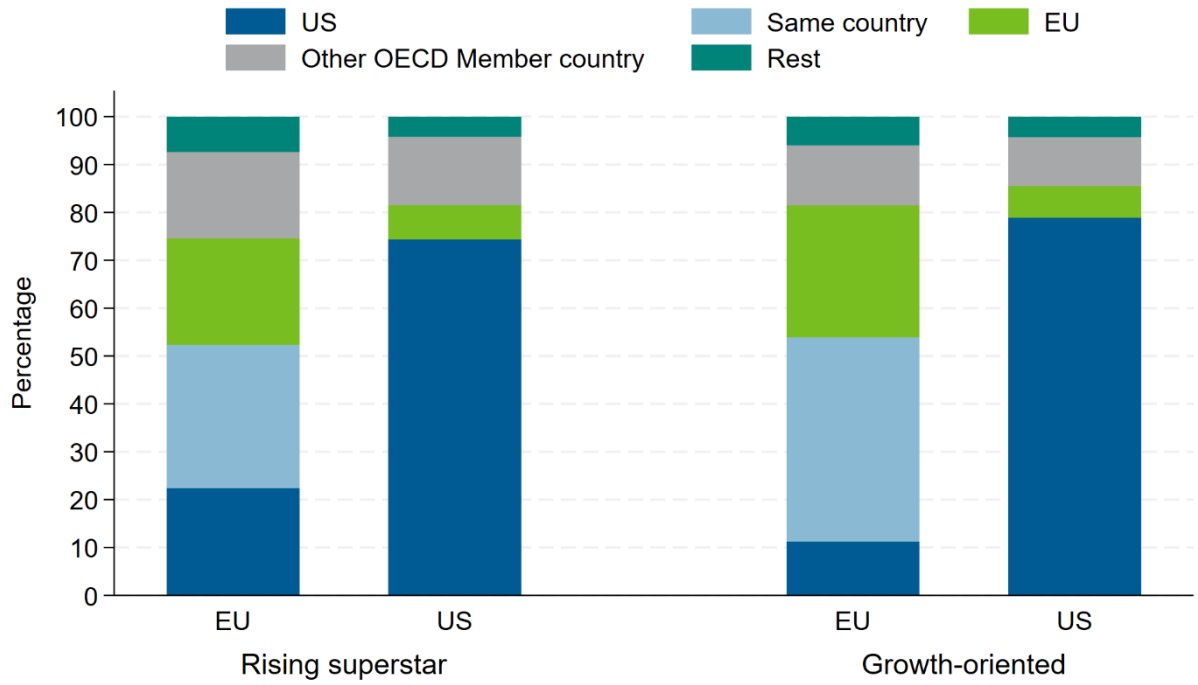
105. Geographical patterns reveal asymmetries in how EU and US firms expand across markets. Figure 4.9 shows that US rising superstars predominantly acquire domestic firms (around 75%), a pattern consistent with the size and integration of the US market. EU rising superstars exhibit a more geographically diversified acquisition footprint. Even when EU domestic and intra-EU acquisitions are considered jointly to reflect the intended functioning of the Single Market, they account for around 60% of all EU acquisitions, and so 15 points less than US domestic acquisitions. At the same time, EU scale-ups make comparatively greater use of extra-EU acquisitions, including targeting US firms (around 20% of acquisitions). While such cross-border expansion may facilitate access to new markets and capabilities, it may also reflect the relative absence of large, integrated domestic markets within Europe, prompting firms to expand externally earlier in their development.

106. In this respect, acquisitions appear to play somewhat different roles across country groups. In the US, they tend to reinforce scaling within a large and integrated domestic market. In the EU, they more often occur across borders – both within and beyond the Union – indicating that European firms may combine domestic/intra-EU consolidation with outward expansion to navigate market fragmentation and access larger, unified markets, an important step to reach scale. A similar, though less pronounced, pattern is observed among growth-oriented start-ups. EU growth-oriented start-ups show a higher propensity to acquire outside the EU, whereas US growth-oriented firms remain more concentrated in domestic acquisitions. Some of the observed differences may reflect structural features

of the two country groups. The US operates as a single, unified market of continental scale, whereas the EU, despite significant integration, remains a multi-country environment, where regulatory, administrative, or market conditions may still vary across borders. As a result, EU scale-ups may naturally rely on a mix of domestic, intra-EU, and extra-EU acquisitions when building scale, even when the underlying motivation is strategic rather than driven by frictions.

107. These findings can be interpreted in several ways. One possibility is that acquisitions help firms overcome practical or operational challenges associated with expanding across borders in Europe, allowing them to access capabilities and markets that remain difficult to reach organically. At the same time, acquisitions should not be viewed solely as responses to such frictions: they may also reflect technology-driven consolidation, strategic repositioning, or expansion into adjacent market segments.

Figure 4.9. Geographical patterns of acquisitions: target origin of acquirer in the EU and in the US



Note: This figure shows the distribution of acquisition targets by country group, conditional on the location of the acquiring start-up (EU and US,). Acquirer start-ups are categorised into two types: rising superstars and growth-oriented, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes 6 812 targets of ICT acquirer start-ups founded between 2000 and 2025 that acquired another firm before their scaling event. Bars report the percentage share of acquisitions targeting firms in the same country as the acquirer, in the EU, in the US, in other OECD Member countries, and in the rest of the world. Shares are calculated at the acquisition-deal level.
Source: OECD Start-ups Database, June 2025.

108. Overall, the evidence in this section suggests that acquisitions are a central channel for market uptake and expansion among scale-ups, especially for rising superstars. By focusing on start-ups as acquirers rather than targets, this analysis highlights an important and complementary dimension of scaling strategies: acquisitions can ease scaling by allowing firms to compress time-to-market, access complementary assets or adjacent markets, bypassing bottlenecks that would otherwise slow organic expansion. Sectoral patterns suggest that acquisitions are relatively more frequent in sectors with high fixed costs and first-mover advantages, such as in digitally intensive sectors, thereby where rapid

capability accumulation and consolidation can be strategically valuable. Geographically, acquisitions tend to reinforce scaling within a large and integrated domestic market in the US, whereas in the EU, acquisitions more often take place across-EU borders, reflecting both strategic expansion choices and the multi-country structure of the European market.

109. Interpreted through this lens, these findings connect naturally to themes highlighted in the EU Start-up and Scale-up Strategy, which points to the importance of reducing barriers to rapid commercial expansion and further deepening Single Market integration. Policies that ease cross-border operations, reduce regulatory and operational frictions, and improve access to procurement and corporate partnerships would not only facilitate organic expansion, but also enhance the effectiveness of acquisition-based growth. At the same time, the ability to pursue acquisition-based growth also reflects broader ecosystem conditions, including access to finance, managerial capacity, and strategic capabilities, underlying the strong complementarities among financing, market integration, and firm-level scaling strategies.

Support for the best talent

110. Human capital is a fundamental driver of start-up performance and a key determinant of firms' ability to scale. While creativity, technical expertise, and entrepreneurial initiative shape the formation of new ventures, scaling introduces a different set of demands. As firms grow, the complexity of managing larger teams, expanding product lines, and entering new markets requires a broader mix of competencies than those needed at creation. The capacity to mobilise, attract, and integrate talent at different stages of the firm lifecycle therefore plays a central role in scaling trajectories.

111. A growing body of work emphasises that scaling relies not only on technological or innovative capabilities, but also on experienced founders and management teams capable of navigating rapid organisational change (Colombo and Grilli, 2005[56]; Unger et al., 2011[57]). While in early-stage entrepreneurship, individual creativity and experimentation may represent the most important hurdles, later-stage entrepreneurship raises different challenges that depend more on managerial depth, governance capabilities, and the ability to attract and integrate specialised expertise over time. These dimensions closely mirror the talent-related challenges identified in the EU Start-up and Scale-up Strategy, including shortages in advanced technical and managerial skills and frictions in talent mobility and retention.

112. This subsection examines the importance of talent in scaling along three complementary dimensions: founders' prior entrepreneurial experience, their formal educational background, and the involvement of external executives as firms grow.

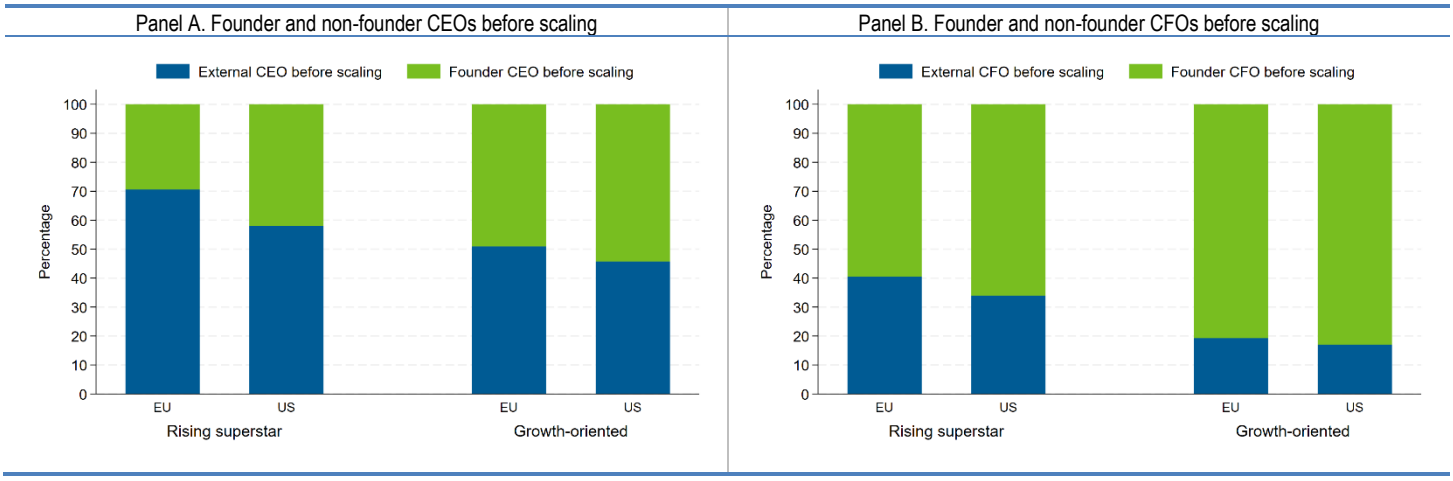
113. Table 3.1 already pointed to two founder-level dimensions that differentiate scaling start-ups from the broader start-up population: entrepreneurial experience and their formal education. Serial founders, defined as founders who have previously created at least one other start-up, are substantially more common among rising superstars than among other start-ups, with the pattern being particularly pronounced in the US. More than 50% of US and 40% of EU rising superstars have at least one serial founder. Growth-oriented start-ups also show higher shares of experienced founders than the average start-up (38% in the US and 33% in the EU). These patterns align with a broader literature showing that prior entrepreneurial experience enhances founders' ability to mobilise resources, form networks, and manage uncertainty (Botelho, Fehder and Hochberg, 2021[44]; Lafontaine and Shaw, 2016[58]; Guiso, Pistaferri and Schivardi, 2021[59]).

114. Formal education attainment further differentiates scale-ups, reflecting the knowledge-intensive nature of many high-growth successful firms. Both rising superstars and growth-oriented start-ups show higher shares of founders with advanced degrees than the overall start-up population. However, the

educational composition differs across country groups. Founder education is relatively concentrated in graduate degrees (43.0%) among EU rising superstars, with a lower share of start-ups with PhD founders (15.6%) and with an undergraduate or lower degree (9.8%). By contrast, US rising superstars display a broader distribution across educational levels, with larger shares at both tails, around 20% with a PhD and 24% with an undergraduate or lower degree compared with the EU, but also with a larger share of start-ups with a graduate degree (37%). Similar patterns, though less pronounced, emerge among growth-oriented start-ups.

115. As start-ups expand, organisational demands often exceed the capabilities of the founding team, making the involvement of external executives a critical component of scaling (Penrose, 2009[43]; Hanifzadeh, Talebi and Jafari-Sadeghi, 2024[60]). The involvement of external executives, particularly non-founder Chief Executive Officers (CEOs) and Chief Financial Officers (CFOs), often marks a transition towards more professionalised organisational structures, which require professionalised management, financial expertise, and governance structures to support rapid expansion. Figure 4.10 shows that rising superstars are more likely than growth-oriented firms to have appointed non-founder CEOs or CFOs before scaling, highlighting that the introduction of external executives is a common feature of more advanced scaling trajectories. Differences between the EU and the US exist but are modest relative to the gap between scaling types: in both country groups, rising superstars professionalise more systematically than growth-oriented start-ups. The arrival of external executives may reflect multiple underlying processes: strategic professionalisation, preparation for capital-raising, governance improvements, or responses to operational challenges (Ewens and Marx, 2017[15]; Chen and Thompson, 2015[61]). Regardless of motivation, these descriptive statistics show that a non-negligible number of start-ups hire professional executives before scaling, pointing to the importance of augmenting founding teams with specialised managerial and financial expertise as firms move from early-stage entrepreneurship to complex organisational growth.

Figure 4.10. Executive arrivals before scaling: Founder and external CEOs and CFOs in the EU and in the US



Note: This figure shows the distribution of start-ups by the type of executive in place prior to scaling, distinguishing between founder and non-founder CEOs (Panel A) and CFOs (Panel B). Bars report the percentage of start-ups categorised into two types: rising superstars and growth-oriented, across two locations: the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025 that had either a founder or a non-founder executive in the corresponding role before reaching scale. Percentages sum to 100 within each start-up type and country group.
Source: OECD Start-ups Database, June 2025.

116. To provide more robust evidence on how these dimensions relate to scaling outcomes, the analysis estimates a multinomial logit model analogous to the one described in Equation 2, which estimates the probability that a start-up becomes i) a growth-oriented start-up or ii) a rising superstar, relative to remaining an innovative start-up. The key explanatory variables capture founders' characteristics (serial founder and PhD founder) and the arrival of external executives before scaling. In addition, the specification also includes sector and cohort fixed effects, as explained for Equation 2. The regression also includes controls for whether the founding team has at least one female founder, and whether it includes at least one founder with a graduate degree (but no PhD).[21]

117. Figure 4.11 displays average marginal effects of the main variables of interest. Panel A shows that prior entrepreneurial experience is strongly and positively associated with scaling, with larger effects for growth-oriented start-ups than for rising superstars and a more important role in the US. Advanced education, particularly holding a PhD, is also positively associated with scaling, especially for US growth-oriented start-ups, while remaining positive but smaller in magnitude for rising superstars and for EU start-ups. The results indicate a negative effect of female founders for both growth-oriented and rising superstar outcomes, consistent with the EU Start-up and Scale-up Strategy's finding that female entrepreneurs continue to face structural barriers. In contrast, the presence of graduate-degree founders shows a positive, though smaller, effect than that of PhD-level founders, highlighting the importance of advanced knowledge and expertise in fostering creative and disruptive ventures.

118. Next, in panel B, the analysis tests whether the involvement of external executives affects the likelihood of scaling, controlling for founder characteristics. Ideally, the variable capturing the arrival of an external executive should take the value 1 only when an external executive joins the start-up before the scaling event. However, because the baseline category of the multinomial model consists of innovative start-ups, which by definition do not experience a scaling event, the "before/after scaling" criterion cannot be applied to them. For these start-ups, the variable is therefore defined more simply: it takes the value 1 if the database reports the arrival of any external executive at any point, and 0 otherwise. To ensure consistency in the variable definition across categories, the estimation excludes scale-ups in which the external executive arrives after the scaling event.[22]

119. The presence of an external CEO is negatively associated with becoming growth-oriented and has no significant effect on rising superstar outcomes, consistent with the finding that CEO replacements may be more likely to occur in response to difficulties or organisational strain rather than as a proactive scaling strategy (Kerr, Nanda and Rhodes-Kropf, 2014[20]; Botelho, Fehder and Hochberg, 2021[44]; Chen and Thompson, 2015[61]; Ewens and Marx, 2017[15]). By contrast, the presence of an external CFO is positively associated with the probability of scaling, highlighting the importance of professional financial expertise in capital mobilisation, investor relations, and strategic expansion.[23]

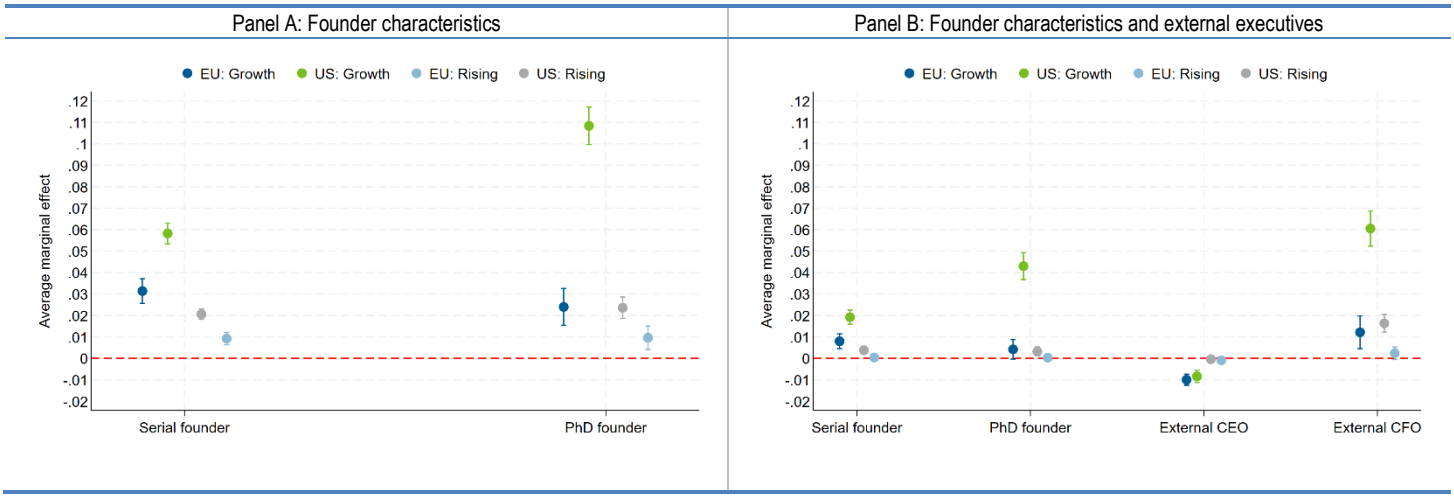
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[21] The results from the multinomial regression are presented in Table A A.2 in Annex A.

[22] Two robustness checks were performed to evaluate how sensitive the results are to different definitions of the variable. The first check assigns a value of 0 to scale-ups where the external executive arrives *after scaling*, instead of excluding these observations. This method keeps all scale-ups in the analysis and produces coefficients similar in sign to the original but generally larger in size. The second check removes scale-ups that never have an external executive, coding the variable as 1 when the executive arrives before scaling and 0 when after. Again, the results change in magnitude but stay consistent in sign. Overall, these tests suggest that the main findings are stable across different definitions of the external-executive variable.

[23] Differences in founder coefficients between Panel A and Panel B reflect changes in sample composition. Panel B excludes scale-ups that appointed external executives *after* scaling, resulting in a smaller and more selective sample. Robustness checks estimating Panel A separately for the sample of firms with external CEOs, external CFOs, and

Figure 4.11. Founder and executive characteristics and the probability of scaling



Note: The figure shows the average marginal effects from the multinomial logit regression, analogous to Equation 2, with the dependent variable being the start-up's scaling outcome: innovative start-up (baseline), growth-oriented start-up, or rising superstar. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars; finally, innovative start-ups are companies that have filed at least one patent or received VC funding. The sample includes start-ups founded between 2000 and 2025. Control variables in both panels include a dummy identifying whether the start-up has one serial founder (vs. none) and a dummy variable for whether a founder has a PhD degree (vs. a lower-level degree). Control variables in Panel B include dummy variables indicating whether the start-up had a non-founder executive in the corresponding role (CEO or CFO) before reaching scale (vs after reaching scale). Control variables not shown in the figure include dummy variables of the founder's gender, graduate education, and fixed effects for cohort and sector. Points represent average marginal effects, and vertical bars denote 95% confidence intervals based on robust standard errors. A positive value indicates a higher probability of the corresponding scaling outcome relative to remaining an innovative start-up.
Source: OECD Start-ups Database, June 2025.

120. Beyond scaling outcomes, talent also shapes the speed at which firms scale. To complement this extensive-margin analysis, the paper employs an OLS regression framework, analogous to Equation 1, to study how founder characteristics and executive arrivals relate to timing among firms that scale.

121. Consistent with the multinomial model, Table 4.5 shows that start-ups founded by serial entrepreneurs and by founders with advanced education reach the scale-up status at younger ages. Moreover, start-ups that appoint non-founder CEOs or CFOs before scaling reach their scaling milestone significantly sooner than otherwise similar firms (by more than one year). These findings reinforce the idea that talent operates along multiple dimensions: entrepreneurial, technical, and managerial. Scaling requires not only capable founders but also timely access to managerial and financial expertise, which often have to be found beyond the firm's boundaries.

122. In line with the evidence reported in the previous pillars, rising superstars scale later than growth-oriented start-ups, highlighting the difficulty of reaching a 1 billion valuation. Similarly, also in this subsample, EU start-ups take longer to scale than their US counterparts, corroborating this result. Finally, as discussed above, the regression also includes controls for whether the founding team has

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both positions replaced (i.e. the sample used in Panel B), indicate that most variation arises in the subsample with external CEOs. In this group, founder characteristics have a smaller estimated effect on the probability of scaling. One possible interpretation is that CEO replacement is endogenous and may occur disproportionately in firms experiencing performance difficulties (Kerr, Nanda and Rhodes-Kropf, 2014[20]; Botelho, Fehder and Hochberg, 2021[44]; Chen and Thompson, 2015[61]; Ewens and Marx, 2017[15]). As a result, the subsample of firms with external CEOs may be negatively selected on unobserved scaling potential, thereby reducing the effect of founder characteristics.

at least one female founder and whether it includes at least one founder with a graduate degree. The results show an accelerating effect of female founders on scaling speed for start-ups that received an external executive, but the presence of graduate-degree founders has a similar accelerating effect than that of PhD-level founders, but lower in magnitude.

123. The same specifications are also estimated including interaction terms between the main variables of interest and the EU and Rising Superstar dummies. These interactions are included to assess whether the effects of key variables differ across start-up types across country groups. These alternative models yield similar results. However, a notable difference emerges for serial founders, which are associated with faster scaling of EU-based scale-ups and of rising superstar.[24]

Table 4.5. Founder and executive characteristics and the age to scaling

	(1)	(2)
At least one serial founder	-0.693***	-0.583***
	(0.061)	(0.095)
At least one founder with a PhD degree	-0.603***	-0.628***
	(0.082)	(0.127)
External CEO arrived before scaling		-1.594***
		(0.110)
External CFO arrived before scaling		-1.558***
		(0.101)
Rising superstar	1.165***	1.455***
	(0.081)	(0.108)
EU	1.139***	0.821***
	(0.082)	(0.130)
Constant	11.103***	12.204***
	(0.143)	(0.212)
Fixed effects	Cohort, Sector	Cohort, Sector
External executive only sample	No	Yes
Observations	11,270	4,233
R-squared	0.415	0.455

Note: This table shows results from ordinary least squares regressions analogous to Equation 1, where the dependent variable is the age at scaling event (in years since founding). Start-ups are categorised into two types: rising superstars and growth-oriented, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025. Control variables in both columns include a dummy variable indicating whether the start-up is headquartered in the EU (vs. the US), a dummy identifying whether the start-up is a rising superstar (vs. growth-oriented), a dummy identifying whether the start-up has one serial founder (vs. none) and a dummy variable for whether a founder has a PhD degree (vs. a lower-level degree). Control variables in Column (2) include dummy variables indicating whether the start-up had a non-founder executive in the corresponding role (CEO or CFO) before reaching scale (vs after reaching scale). Control variables not shown in the figure include dummy variables of the founder's gender, graduate education, and fixed effects for cohort and sector. Coefficients indicate how each variable affects age at scaling: a negative coefficient indicates earlier scaling, whereas a positive coefficient indicates later. Column (1) includes both growth-oriented and rising superstar start-ups in the EU and US, while Column (2) only include those start-ups that have information on external executives. Robust standard errors are in parentheses; significance: *p<10%, **p<5%, ***p<1%.
Source: OECD Start-ups Database, June 2025.

124. The patterns documented here highlight the central role of talent in shaping scaling trajectories and point to areas where policy can help strengthen the pool and circulation of skills within the

[24] The results including interaction terms are available upon request. To preserve clarity and readability, these results are not reported in tables given the large number of interaction terms.

entrepreneurial ecosystem (Rossi and Desoche, 2025[62]; European Commission, 2025[1]). Measures that facilitate the circulation of experienced entrepreneurs and executives, support managerial upskilling, and reduce barriers to attracting global talent can play an important role in accelerating scale-up trajectories.

125. Importantly, the effectiveness of such policies depends on their interaction with other dimensions of the entrepreneurial environment. Access to finance, regulatory simplicity, and market integration all shape firms' ability to attract, retain, and effectively deploy talent during critical growth phases. As firms scale, success increasingly depends on the ability to recombine founding teams with experienced managerial and financial expertise – often sourced beyond the firm itself. This points to the importance of an ecosystem-level perspective, which is addressed explicitly in the final pillar.

Access to infrastructure, networks, and services

126. Scaling is shaped not only by firm-specific characteristics and capabilities, but also by the quality and coordination of the broader entrepreneurial ecosystems in which firms operate. Entrepreneurial ecosystems bring together complementary resources – including capital, specialised labour, research organisations, support services and market opportunities – and reduce the costs of accessing them. In doing so, they shape firms' ability to combine multiple inputs simultaneously during critical growth phases.

127. Urban concentration, connectivity, and ecosystem depth are commonly identified as factors that facilitate scaling, while ecosystems' fragmentation can slow growth even for high-potential firms. This view aligns with a substantial body of empirical work showing that proximity to high-growth and VC-backed firms enhances access to investors, skilled workers, and knowledge flows, thereby improving innovation outcomes (Chikis, Kleinman and Prato, 2025[63]; Samila and Sorenson, 2011[8]; Glaeser, Kerr and Ponzetto, 2010[6]; Bock and Hackober, 2020[46]; Guiso, Pistaferri and Schivardi, 2021[59]).

128. The preceding subsections of this paper have shown that scaling outcomes differ across the EU and the US along multiple dimensions, including funding, market expansion, and talent. Crucially, these dimensions do not operate in isolation: their effectiveness depends on whether local ecosystems enable firms to combine them efficiently during critical growth phases. An ecosystem approach can therefore complement the firm-level evidence by clarifying how local conditions shape scaling opportunities across locations.

129. To assess how local ecosystems relate to scaling, the subsequent analysis examines how local entrepreneurial activity evolves following the emergence of their first scaling firm (either rising superstar or growth-oriented) in a given ecosystem. The central question is whether the success of an individual firm is followed by wider ecosystem responses, through learning, signalling, and network formation. Several channels may underpin ecosystem responses. Successful scale-ups can act as a role model for future founders and managers, attract specialised suppliers and investors, and signal the viability of local opportunities to external actors. At the same time, if ecosystems lack depth or connectivity, these effects may be weaker or take longer to materialise, even when individual firms achieve strong outcomes.

130. To capture ecosystem dynamics, start-ups are assigned to their corresponding OECD Functional Urban Areas (FUAs), which provide a consistent definition of local labour markets and commuting zones. Because FUAs approximate real economic geographies rather than administrative boundaries, they offer a more accurate representation of the environments in which firms operate and interact.

131. Table 4.6 provides some descriptive statistics showing substantial cross-country group differences in the distribution and characteristics of start-ups across FUAs. The EU contains 493 FUAS with almost 400 thousand start-ups, an average of roughly 806 per FUA, whereas the US contains 263 FUAs hosting more than 750 thousand start-ups, or nearly three thousand per FUA. This large difference reveals a much higher density of entrepreneurial activity in US urban areas. Dense ecosystems foster frequent interactions among entrepreneurs, investors, and skilled workers, amplifying spillovers and accelerating scaling processes.

132. The table shows, for each variable reported across rows, the percentage of FUA with at least one start-up with the characteristics specified in the first column, and the average number of start-ups with that given characteristic. In the EU, about 12% of FUAs host at least one rising superstar, compared with roughly 25% in the US. A similar pattern holds for growth-oriented start-ups: around 34% of EU FUAs host at least one, versus about 67% in the USA. The table then indicates how concentrated these firms are within FUAs. On average, EU FUAs host fewer than one rising superstar (0.68), while US FUAs host around five (5.03). A similar difference appears for growth-oriented firms: EU FUAs average about three (3.43) growth-oriented start-ups, compared with around thirty (30.46) in the US. Taken together, these figures suggest that scaling activity is both more geographically widespread and more concentrated within individual FUAs in the US than in the EU, potentially limiting opportunities for local spillovers and cumulative learning in the EU.

Table 4.6. Distribution and characteristics of start-ups across FUAs in the EU and in the US

	EU			US		
	Total	**% of FUAs**	**Avg start-ups per FUA**	**Total**	**% of FUAs**	**Avg start-ups per FUA**
FUA	493			263		
Number of start-ups	397,739		806.77	759,063		2,886.17
Rising superstar		11.56	0.68		25.48	5.03
Growth-oriented		34.08	3.43		67.30	30.46
Innovative		92.49	100.66		99.24	368.80

Note: This table presents descriptive statistics of start-ups across Functional Urban Areas (FUAs). Start-ups are categorised into three types: rising superstars, growth-oriented, and innovative, across two locations, the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars; finally, innovative start-ups are companies that have filed at least one patent or received VC funding. The sample includes start-ups founded between 2000 and 2025. The "Total" column shows the number of FUAs, and the total number of start-ups located in those FUAs. "% of FUAs" indicates the percentage of FUAs that have at least one start-up with the specified characteristic. "Avg. start-ups per FUA" reports the average number of start-ups per FUA for each characteristic.
Source: OECD Start-ups Database, June 2025; Schiavina et al. (2019[40]).

133. Identifying the role of ecosystems empirically is challenging because high-potential firms may sort into already dynamic locations. Simple cross-sectional comparisons would therefore confound ecosystem effects with selection: FUAs that eventually produce rising superstars or growth-oriented start-ups may already have stronger institutions, deeper capital markets, or more favourable economic conditions before the first scaling event. To mitigate this concern, the analysis exploits the timing of the first emergence of a scaling firm (either rising superstar or growth-oriented) in each FUA. Specifically, the analysis considers the year in which an FUA produces its first scaling event (its first rising superstar and its first growth-oriented start-up, analysed separately) as an event, i.e. the *treatment*, and examines how ecosystem outcomes evolve around it.

134. To separate these mechanisms, the analysis uses a staggered Difference-in-Differences (DiD) estimator following de Chaisemartin and D'Haultfoeuille (de Chaisemartin and D'Haultfœuille, 2024[64]).

This approach compares treated FUAs, i.e. those that have produced their first scaling, to not-yet-treated FUAs, i.e. those that will be treated in the future, rather than to FUAs that never experience such event.[25]

135. The specification is:

$$\widehat{\mathrm{DID}}_l = \frac{1}{N_l} \sum_{i:\, F_i - 1 + l \le T} \left[Y_{i,\, F_i - 1 + l} - Y_{i,\, F_i - 1} - \frac{1}{N^*_{i,l}} \sum_{j:\, F_j > F_i - 1 + l} \left(Y_{j,\, F_i - 1 + l} - Y_{j,\, F_i - 1} \right) \right],$$

Equation 3

where for each treated FUA i, the coefficient $\widehat{\mathrm{DID}}_l$ compares the change in the outcome from the last pre-treatment period ($F_i - 1$) to event time l with the corresponding change observed in FUAs that have not yet been treated at the same event time l. The first term, $Y_{i,\, F_i - 1 + l} - Y_{i,\, F_i - 1}$, captures the outcome change in the treated FUA between the pre-treatment baseline and event time l. The second term averages the same change across all FUAs j whose treatment occurs strictly after $F_i - 1 + l$, ensuring they serve as valid "not-yet-treated" controls at that horizon. Taking the difference between these two components yields differential post-treatment evolution attributable to the emergence of the first scaling, net of background trends in ecosystems on similar trajectories. The resulting event-time coefficients trace out the dynamic effects of treatment before and after the scaling event. Standard errors are clustered at the FUA-level.

136. The baseline regression estimates the effect of the first scaling event ("treatment") on three indicators of ecosystem dynamism: i) the number of newly founded start-ups; ii) the number of newly founded patenting start-ups; and iii) aggregate venture capital investment in the FUA.[26] All outcomes are normalised to the pre-treatment mean within each country group, enabling a percentage-style interpretation. For example, a coefficient of 0.10 can be interpreted as an increase of roughly 10% relative to the average pre-treatment level of the outcome in treated FUAs within that country group.

137. Results differ both by type of first scaling event (first rising superstar versus first growth-oriented start-up) and by country group. Figure 4.12 shows that the appearance of a first rising superstar is not associated with a statistically significant change in overall start-up creation in either EU FUAs (Panel A) or US FUAs (Panel B). In contrast, the first growth-oriented start-up is associated with a statistically significant increase in start-up entry in both country groups (Panels C and D). The dynamics also differ: in EU FUAs, the post-treatment increase builds over time (from around 5% in the first year to above 20% by year four), whereas the corresponding pattern in US FUAs is positive but more modest and flatter.

138. Patterns are different when focusing on innovative entrepreneurial activity. Figure 4.13 reports the effects of the first rising superstar and the first growth-oriented on the number of newly founded start-ups that ever file for a patent. Following the emergence of a first rising superstar, patenting start-up formation increases progressively in US FUAs (Panel B), with effects growing over time (approximately 10% initially and reaching around 40% five years after treatment). In contrast, EU FUAs

[25] This comparison reduces concerns arising from contrasting ecosystems with fundamentally different characteristics. By focusing only on treated FUAs, the analysis focuses on a more comparable sample, alleviating these concerns. Identification relies on the assumption that, absent treatment, treated and not-yet-treated FUAs would have followed similar trends (i.e. no differential pre-trends or anticipation effects).

[26] Note that, for this specific exercise, the analysis looks at the overall number of start-ups founded in a given FUA-year. Using this wider sample allows for a more comprehensive assessment of how the presence of scale-ups shapes local entrepreneurial ecosystems, as it enables to distinguish between overall entry dynamics and innovative start-up formation within the same local ecosystem.

innovative entrepreneurial activity does not react to this treatment (Panel A). When focusing on the first growth-oriented start-up (Panels C and D), effects on patenting entry are more pronounced in EU FUAs, though they become statistically significant only in later years; in US FUAs, the post-treatment pattern is positive and significant, but less pronounced than in the rising-superstar case.

139. The contrast between the two treatments suggests that alternative scaling events are associated with different types of local spillovers. Growth-oriented firms appear more consistently linked to subsequent increases in local entry, which is consistent with scaling trajectories that remain closely connected to local labour markets, investors and networks. By comparison, the results for rising superstars indicate more selective ecosystem responses, concentrated in innovation-intensive entry in the US, and weaker (or absent) responses in the EU.

140. The cross-country contrast is consistent with the idea that the emergence of a rising superstar does not necessarily increase the volume of entrepreneurship everywhere, but may instead reshape its composition, particularly where ecosystem conditions are sufficiently deep and connected.

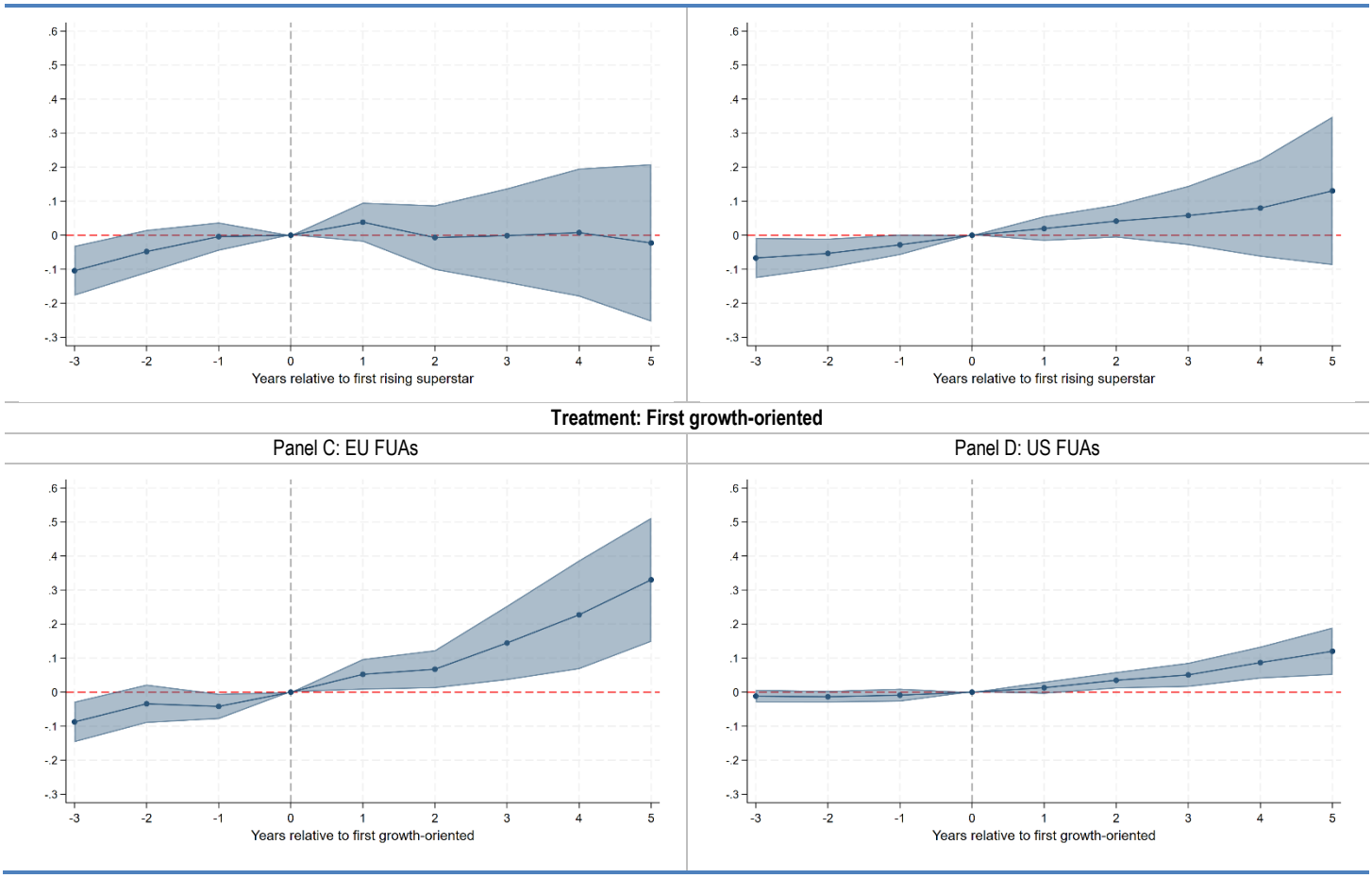
141. In the US, the combination of no significant effect on overall start-up formation and sizeable effects on entry of innovative start-ups is consistent with a compositional shift toward more innovation-intensive entrepreneurial activity following the first rising superstar. In dense and technologically advanced ecosystems, only extreme scaling events may significantly update expectations about high-risk innovation. Rising superstars may therefore shift entry toward more innovation-intensive ventures, rather than expand entry at the extensive margin.

142. In the EU, the absence of comparable effects on overall and patenting start-up formation suggests that rising-superstar emergence is less systematically associated with broad local entry responses, reflecting weaker ecosystem “amplification” mechanisms. As shown in the pillars above, EU rising superstars depend more heavily on internationally integrated networks, relying on global capital and markets rather than mobilising local ecosystem resources. As a result, their scaling trajectory may therefore be less embedded in the domestic ecosystem, limiting the extent to which their success translates into local entrepreneurial dynamism.

143. As reported in Figure 4.14, the results for VC differ from those on start-up formation. Both treatments (first rising superstar and first growth-oriented firm) are associated with increases in VC activity in both country groups. Effects are particularly pronounced in EU FUAs following the first raising superstar, with VC funding increasing sharply (reaching approximately 80% above baseline levels by the second post-treatment year), though confidence intervals are wide, pointing to substantial heterogeneity across FUAs. In US FUAs, the effects are also positive and statistically significant, but smaller in magnitude. One interpretation consistent with these patterns is that large scaling events provide a salient signal to investors, particularly in environments where local capital markets are relatively thinner. In such contexts, the emergence of a major scaling event may reduce perceived uncertainty and attract additional venture capital, including from outside the country. In the EU, where capital is relatively mobile compared to skilled labour and entrepreneurial activity (for example, due to cultural and language barriers), VC responses may materialise more quickly than entry responses.

Figure 4.12. Effects of the first scaling event on start-up formation in the EU and in the US

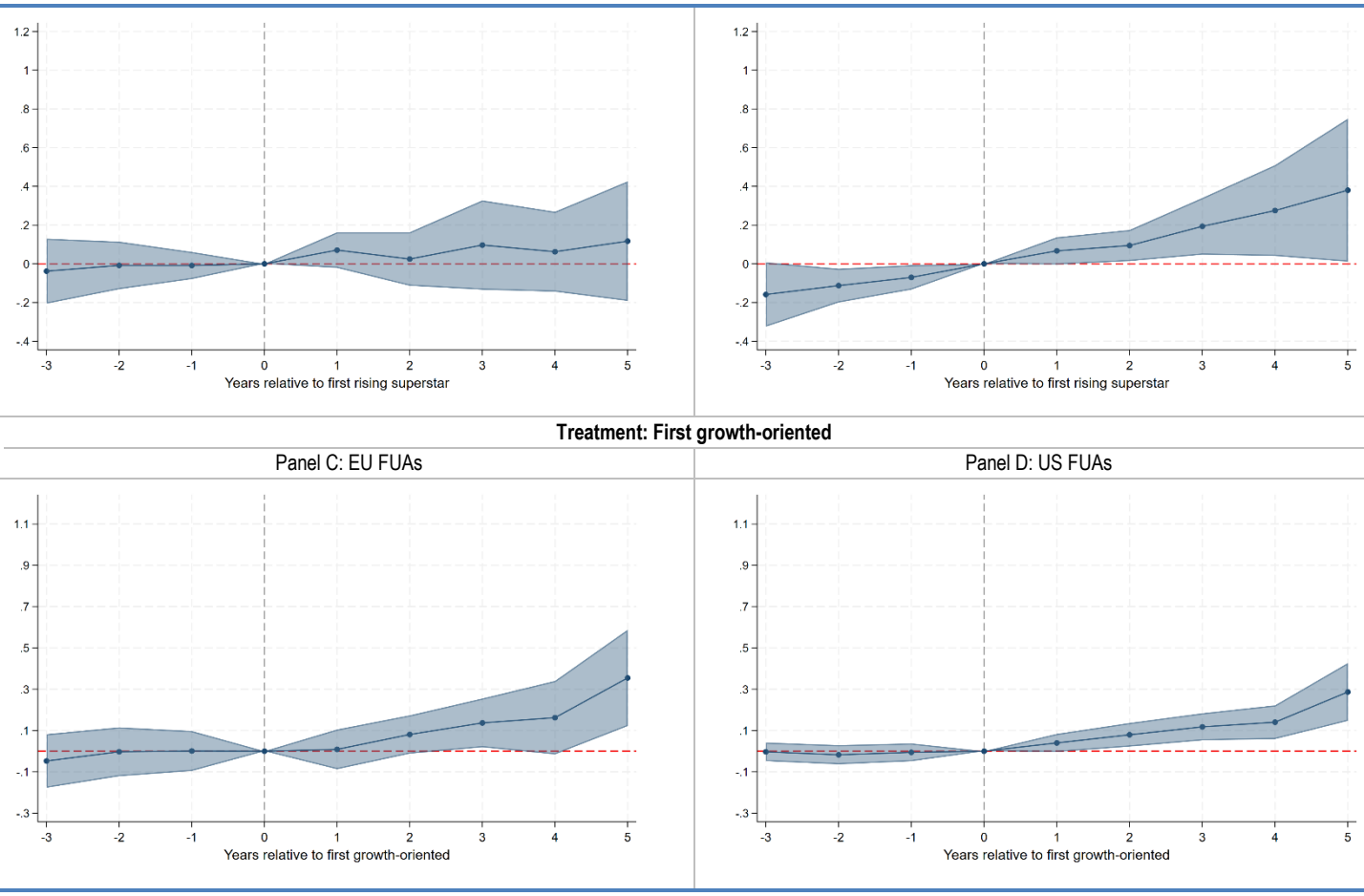
Treatment: First rising superstar	
Panel A: EU FUAs	Panel B: US FUAs



Note: This figure reports event-study estimates from staggered difference-in-differences models following de Chaisemartin and D'Haultfœuille (2024[64]). Panels A and B examine the effect of a Functional Urban Area's (FUA's) first rising superstar, while Panels C and D examine the effect of its first growth-oriented. Panels A and C refer to EU FUAs, and Panels B and D to US FUAs. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. "Treated FUAs" are those that have produced their first rising superstar or growth-oriented, while "not-yet-treated FUAs" are those that will do so in the future but have not yet reached their treatment year. The dependent variable is expressed as a percentage of its unconditional average. Thus, a positive value at event time t indicates that treated FUAs experienced a larger increase in start-up formation relative to not-yet-treated FUAs. The treatment year corresponds to the first year in which an FUA hosts a rising superstar or a growth-oriented. Points represent the treatment effect, and the shaded area shows 95% confidence intervals based on standard errors clustered at the FUA level.
Source: OECD Start-ups Database, June 2025; Schiavina et al. (2019[40]).

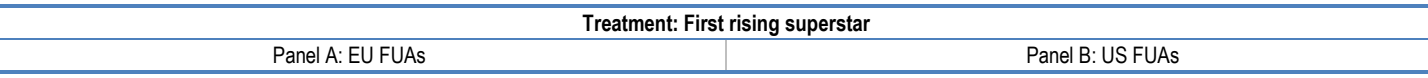
Figure 4.13. Effects of the first scaling event on start-up patenting formation in the EU and in the US

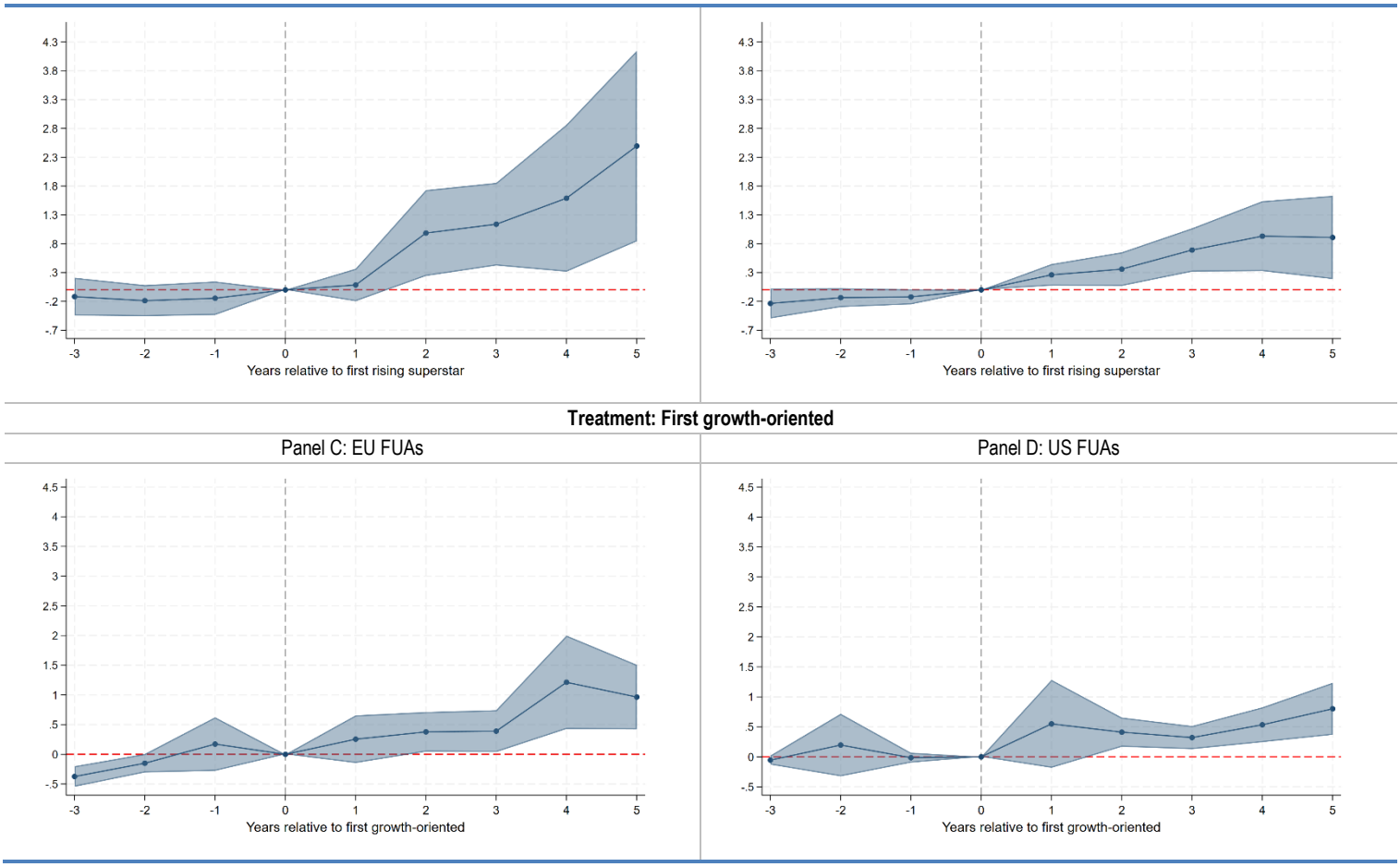
Treatment: First rising superstar	
Panel A: EU FUAs	Panel B: US FUAs



Note: This figure reports event-study estimates from staggered difference-in-differences models following de Chaisemartin and D'Haultfœuille (2024[64]). Panels A and B examine the effect of a Functional Urban Area's (FUA's) first rising superstar, while Panels C and D examine the effect of its first growth-oriented. Panels A and C refer to EU FUAs, and Panels B and D to US FUAs. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. "Treated FUAs" are those that have produced their first rising superstar or growth-oriented, while "not-yet-treated FUAs" are those that will do so in the future but have not yet reached their treatment year. The dependent variable is expressed as a percentage of its unconditional average. Thus, a positive value at event time t indicates that treated FUAs experienced a larger increase in start-up formation relative to not-yet-treated FUAs. The treatment year corresponds to the first year in which an FUA hosts a rising superstar or a growth-oriented. Points represent the treatment effect, and the shaded area shows 95% confidence intervals based on standard errors clustered at the FUA level. Source: OECD Start-ups Database, June 2025; Schiavina et al. (2019[40]).

Figure 4.14. Effects of the first scaling event on total VC funding in the EU and in the US





Note: This figure reports event-study estimates from staggered difference-in-differences models following de Chaisemartin and D'Haultfœuille (2024[64]). Panels A and B examine the effect of a Functional Urban Area's (FUA's) first rising superstar, while Panels C and D examine the effect of its first growth-oriented. Panels A and C refer to EU FUAs, and Panels B and D to US FUAs. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. "Treated FUAs" are those that have produced their first rising superstar or growth-oriented, while "not-yet-treated FUAs" are those that will do so in the future but have not yet reached their treatment year. The dependent variable is expressed as a percentage of its unconditional average. Thus, a positive value at event time t indicates that treated FUAs experienced a larger increase in the amount of VC funding attracted relative to not-yet-treated FUAs. The treatment year corresponds to the first year in which an FUA hosts a rising superstar or a growth-oriented. Points represent the treatment effect, and the shaded area shows 95% confidence intervals based on standard errors clustered at the FUA level.
Source: OECD Start-ups Database, June 2025; Schiavina et al. (2019[40]).

144. Taken together, the event-study patterns are consistent with the idea that the first scaling event in an ecosystem can be followed by changes in local entrepreneurial activity. The analysis has shown that ecosystem responses to scaling events are not automatic: they depend on ecosystem depth and on the type of scaling event.

145. However, some of the baseline estimates display some pre-treatment trends, with treated FUAs already exhibiting rising entrepreneurial activity before producing a scale-up firm. This suggests that treated FUAs were already on a different trajectory prior to producing a scale-up, raising the possibility that some of the post-treatment increase may reflect underlying ecosystem maturation rather than a causal effect of scaling emergence. In particular, joint tests of the null hypothesis that all pre-trend coefficients are zero are rejected for EU start-up formation (both for rising superstar and growth-oriented treatments) and for VC funding outcomes (for growth-oriented treatment).

146. To account for this concern and to provide more robust empirical evidence, the analysis implements two robustness exercises. First, the baseline staggered difference-in-differences is augmented with some additional variables that help control for a set of time-varying FUA characteristics capturing local economic conditions and research intensity, including total employment, GDP (relative to the national aggregate, labour productivity (in USD), and measures of research activity derived from ROR-linked institutions. This exercise helps account for observable time-varying characteristics that may influence ecosystem dynamics and potentially confound the estimated effects.

147. Second, a propensity score matching (PSM) procedure to improve comparability between treated and control FUAs. Treated FUAs are matched to control FUAs with similar pre-treatment characteristics (Imbens, 2004[65]). Specifically, the exercise is built in three steps. First, a probit estimation is performed to compute the predicted probability that each FUA produces an event (the dependent variable is a dummy that takes the value 1 if the first scale-up occurs and 0 otherwise). Then, the predicted probabilities are used to match treated and control FUAs. Lastly, the matching sample is used in the de Chaisemartin and D'Haultfoeuille (2024[64]) estimation procedure. The variables used in the matching exercise are the same ones used in the first robustness exercise, the year before the treatment. This exercise allows to select a control group of untreated FUAs which, at least based on observable characteristics before treatment, were as similar as possible to the treated observations.

148. The inclusion of controls and the propensity score matching procedure modify the estimation sample, reducing significantly the number of FUAs included in the analysis. In the controlled specifications, FUAs with missing controls are excluded, leading to a smaller sample. In the matching framework, these exclusions apply as well, and, in addition, treated and control FUAs falling outside the common support region are dropped by construction. These sample changes reduce both the cross-sectional and temporal variation used for identification, resulting in larger standard errors and wider confidence intervals. Nevertheless, the patterns remain broadly consistent with the baseline results. The results of these exercises are presented in Annex A.

149. Taken together, this evidence underscores that ecosystems are not merely a backdrop for scaling, but a channel through which multiple constraints and enablers mentioned before interact. The emergence of a successful firm can act as a focal point that attracts resources and stimulates further entrepreneurial activity, but the strength, composition and speed of these effects depend critically on the surrounding environment. Access to finance determines whether resources can be mobilised; talent availability shapes firms' capacity to manage growth; regulatory frameworks affect experimentation and entry; and market integration governs the scope of expansion. Ecosystems determine whether these inputs can be effectively recombined during critical scaling phases. Differences in ecosystem depth, connectivity, and responsiveness therefore help explain persistent gaps in scale-up performance, even where firm-level characteristics appear broadly comparable.

150. The cross-country contrast is consistent with differences in ecosystem "amplification" mechanisms. In ecosystems that are denser and closer to the technological frontier, scaling events appear more likely to be followed by compositional shifts toward innovation-intensive entry. In settings where ecosystems are less dense or more fragmented, responses may instead materialise through different channels, such as stronger reactions in venture capital inflows or more gradual increases in entry following growth-oriented events.

151. From a policy perspective, these findings reinforce the EU Start-up and Scale-up Strategy's emphasis on ecosystem-oriented interventions. Strengthening local ecosystem density, improving cross-border connectivity, and reducing fragmentation across markets can increase the likelihood that individual scale-up successes translate into sustained, system-wide local growth. In this sense, ecosystem policies are not a substitute for reforms in other pillars, but rather a complement to them,

helping ensure that scaling successes translate into more durable and broad-based entrepreneurial dynamism.

5 Conclusions

152. This paper has examined the characteristics and scaling trajectories of rising superstar and growth-oriented start-ups across the European Union and the United States over the past two decades using the OECD Start-ups Database. It documents a persistent EU–US scale-up gap: while both country groups generate innovative and high-potential start-ups, EU firms are less likely to reach the most advanced scaling outcomes and, when they do, they tend to scale later. Importantly, these differences do not appear to be primarily due to sectoral composition: scaling firms in both country groups are concentrated in ICT and other knowledge-intensive service sectors. Instead, the evidence points to a set of structural differences affecting the pipeline from early promise to large-scale growth.

153. The analysis organises the evidence around five dimensions – regulation, finance, market expansion, talent, and ecosystems, and shows that different levers matter in different ways across stages of the scale-up process and across locations. Importantly, these dimensions interact: scaling is rarely constrained by a single factor, but rather by how effectively ecosystems enable firms to combine finance, managerial capacity, market access, and innovation capabilities during critical growth phases.

154. **Innovation-friendly regulation**. This pillar is examined through the lens of patenting activity, used as a proxy for the institutional and regulatory conditions shaping firms' incentives and ability to formalise and commercialise innovation. In the realm of innovation-friendly regulation, the EU does not exhibit weaker inventive capacity among firms that patent. EU scale-ups are less likely to patent than US scale-ups, but those that do patent do not appear weaker in inventive intensity. The key difference is the translation from invention to scale: EU firms display longer delays between first patenting and the attainment of scale-up status, consistent with frictions along the commercialisation pathway rather than a simple deficit in knowledge creation.

155. **Better finance for start-ups and scale-ups**. Financing conditions present a similarly nuanced picture. Early-stage funding trajectories appear relatively comparable across country groups; however, the US ecosystem is better able to mobilise very large late-stage rounds for a relatively small number of firms receiving exceptionally large funding rounds in the US. The main divergence in financing gaps therefore emerges at late-stage capital rounds and it is driven by the upper tail. Investor networks matter alongside volumes: early participation by globally connected investors – especially US investors for EU firms –is systematically associated with higher and faster scaling. This pattern is consistent with the idea that investors provide not only capital but also expertise, networks, and credibility, which can accelerate growth trajectories.

156. **Fast market uptake and expansion.** Acquisitions are a recurrent feature of scaling strategies in both country groups, mostly among rising superstars. However, the geography of the acquisition targets differs, reflecting the structure of home markets: US scale-ups predominantly acquire domestically, while EU scale-ups combine domestic, intra-EU and extra-EU acquisitions. This suggests that European scale-ups may rely more systematically on cross-border expansion strategies, potentially as a way to access larger markets, capabilities and networks, consistent with the EU's multi-jurisdiction environment. Acquisitions are more prevalent in sectors, such as ICT, in which rapid capability accumulation, market positioning, and speed of expansion are particularly important.

157. **Support for the best talent**. Talent constitutes another key dimension of the scale-up process. Talent-related factors – founder experience and education, and the early arrival of external executives, specifically CFOs – are consistently associated with higher scaling probabilities and faster transitions to scale in both country groups. These results reinforce the importance of professionalisation as firms grow, and point to the role of ecosystems in enabling the matching and circulation of specialised entrepreneurial, managerial and technical skills

158. **Access to infrastructure, networks, and services.** Scaling is shaped not only by firm-specific characteristics, but also by the broader entrepreneurial ecosystems in which firms operate. The ecosystem analysis further indicates that responses to scaling events are not automatic and vary by the type of scaling firm and by context. The emergence of a first growth-oriented firm is associated with subsequent increases in local start-up entry – particularly in EU FUAs – while the emergence of a first rising superstar is more strongly associated with innovation-intensive entry in US FUAs. VC activity rises following both types of scaling events, with particularly pronounced but heterogeneous responses in the EU, consistent with signalling effects in settings where local capital markets are thinner and more fragmented.

159. To conclude, the evidence points to a set of structural conditions that shape scaling outcomes – particularly the depth and connectivity of late-stage finance, frictions affecting expansion across jurisdictions, and the capacity to attract and mobilise specialised entrepreneurial and managerial talent. From a policy perspective, the results underscore complementarities across pillars: progress is likely to be strongest when reforms are pursued in a coordinated way, rather than through isolated interventions. In practical terms, this can involve streamlining innovation-relevant procedures (including IP-related processes that affect the timing of commercialisation), strengthening late-stage risk-capital channels and investor connectivity (including mechanisms that facilitate larger follow-on rounds and cross-border syndication), reducing operational and regulatory barriers that slow market expansion across jurisdictions, improving access to experienced managerial and financial expertise, and reinforcing ecosystem density and connectivity so that scaling events translate more consistently into broader entrepreneurial dynamism.

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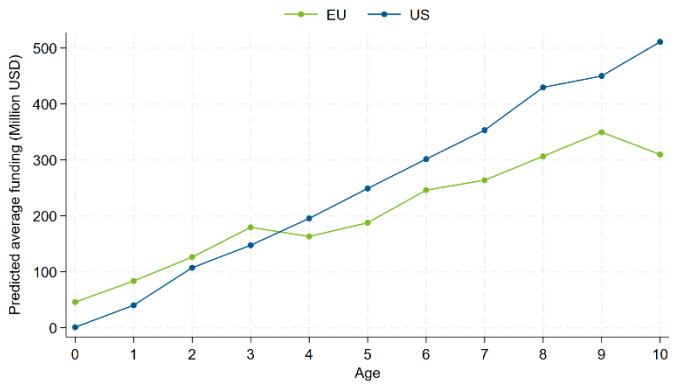
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Annex A. Additional figures and tables

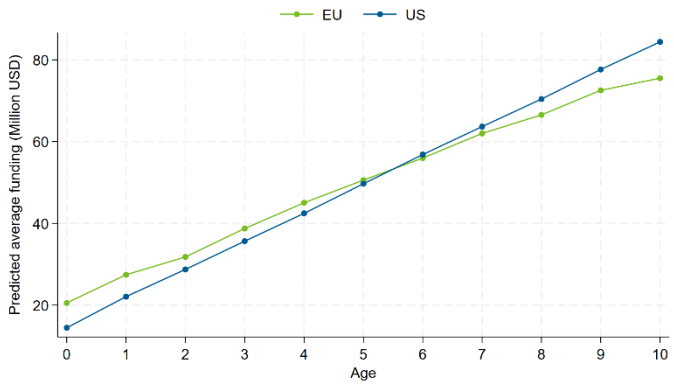
Better financing for start-ups and scale-ups

Figure A A.1. Predicted cumulative funding by start-up age and country group in the EU and in the US

Panel A: Rising superstars



Panel B: Growth-oriented

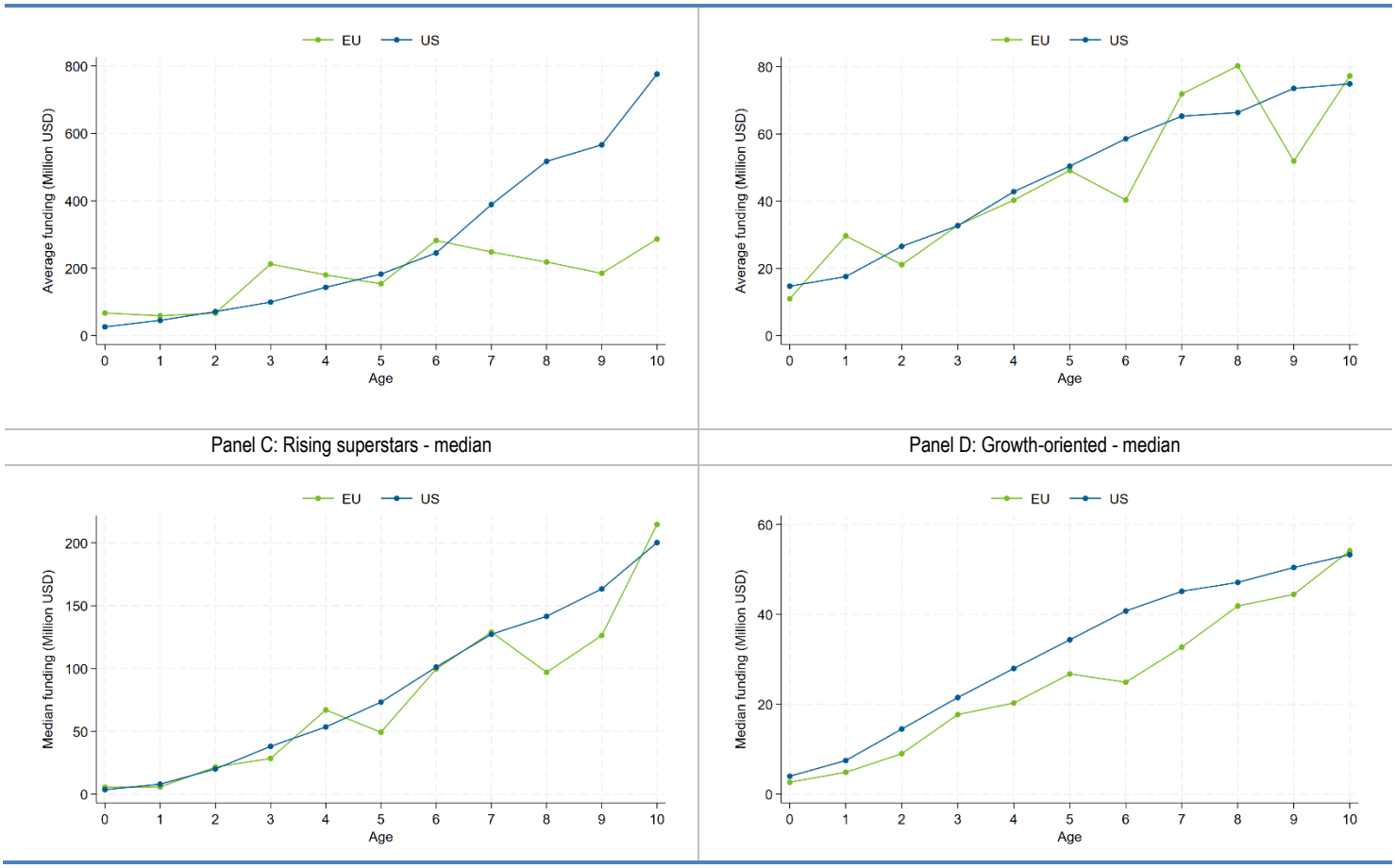


Note: This figure plots regression-adjusted predictions of average cumulative funding per start-up (in millions of USD) categorised into two types: rising superstars and growth-oriented, across two locations: the EU and the US. Start-ups are categorised into two types: rising superstars and growth-oriented, across two locations: the EU and the US. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2025 and funding deals received before the start-ups scaled up. Predictions are obtained from start-up-level regressions of cumulative funding on firm age interacted with location, controlling for calendar-year fixed effects and sector fixed effects. Year controls account for aggregate time trends in venture capital markets, while sector fixed effects absorb systematic differences in funding intensity across industries. Funding values are adjusted using OECD PPP-based price level indices (OECD = 100) to ensure cross-country comparability in real purchasing power. The shape and relative differences across locations remain robust to these controls.
Source: OECD Start-ups Database, June 2025; OECD Purchasing power parities database (2024[54]).

Figure A A.2. Average pre-scaling cumulative funding by age of ICT scaling start-ups in the EU and in the US

Panel A: Rising superstars - average

Panel B: Growth-oriented - average



Note: This figure shows the evolution of average cumulative funding (in millions of USD) per start-up over its age (in years) for rising superstars (Panel A) and growth-oriented (Panel B) start-ups in the EU and the US. Panels C and D show the equivalent results for the median, respectively for rising superstars and growth-oriented start-ups. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. The sample includes start-ups founded between 2000 and 2021 and funding deals received before the start-ups scaled up. Funding amounts are reported in USD and adjusted using OECD PPP-based price level indices (US = 100) to account for cross-country differences in purchasing power.
Source: OECD Start-ups Database, June 2025; OECD Purchasing power parities database (2024[54]).

Table A A.1. Multinomial logit estimates: investor characteristics and the probability of start-up scaling

		(1)	(2)	(3)	(4)
		Growth-oriented	Rising superstar	Growth-oriented	Rising superstar
More than one investor in first deal		0.758***	0.834***	0.692***	0.518***
		(0.033)	(0.070)	(0.067)	(0.143)
	x EU	-0.066	-0.342**		
		(0.075)	(0.161)		
At least one foreign investor in first deal		-0.039	0.005		
		(0.033)	(0.066)		
	x EU	0.495***	1.056***		
		(0.075)	(0.160)		
At least one EU (foreign) in first deal				0.213**	0.774***

				(0.101)	(0.222)
At least one foreign non-EU (excl. US) in first deal				0.398***	0.878***
				(0.085)	(0.206)
At least one US (foreign) in first deal				0.800***	1.629***
				(0.085)	(0.183)
Raised amount (USD - PPP)		0.105***	0.142***	0.079***	0.097***
		(0.002)	(0.003)	(0.003)	(0.004)
	x EU	-0.024***	-0.044***		
		(0.004)	(0.005)		
Age at first deal		-0.228***	-0.335***	-0.210***	-0.300***
		(0.008)	(0.018)	(0.014)	(0.029)
	x EU	0.024	0.078**		
		(0.015)	(0.034)		
EU		-0.964***	-1.021***		
		(0.067)	(0.153)		
Constant		-1.464***	-4.247***	-1.886***	-3.674***
		(0.077)	(0.190)	(0.194)	(0.418)
Cohort effect		Yes	Yes	Yes	Yes
Sector effect		Yes	Yes	Yes	Yes
EU sample only		No	No	Yes	Yes
Observations		81,433	81,433	28,160	28,160
Chi-square stat		15,770	15,770	2,744	2,744

Note: shows the average marginal effects from the multinomial logit regression in Equation 2, which dependent variable is the start-up's scaling outcome: innovative start-up (baseline), growth-oriented start-up, or rising superstar. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars; finally, innovative start-ups are companies that have filed at least one patent or received VC funding. The sample includes start-ups founded between 2000 and 2025 and funding deals received before the start-ups scaled up. Control variables include a dummy variable for whether the first deal was syndicated (vs. not syndicated) and a dummy variable for whether it involved at least one foreign investor (vs. only domestic investors; for EU start-ups, foreign refers to non-EU investors), dummy variables distinguishing investors from the EU, the US, and other non-EU countries, the first deal's volume, and the start-up's age at the first deal. Control variables not shown in the figure but included fixed effects for cohort and sector. Columns (1)–(2) report results for the full sample, including interactions with an EU indicator to capture differential effects between EU and US start-ups. Columns (3)–(4) restrict the sample to EU start-ups only. Funding amounts are reported in USD and adjusted using OECD PPP-based price level indices (US = 100) to account for cross-country differences in purchasing power. Robust standard errors are in parentheses; significance: *p<10%, **p<5%, ***p< 1%.

Source: OECD Start-ups Database, June 2025; OECD Purchasing power parities database (2024[54]).

Support for the best talent

Table A A.2. Multinomial logit estimates: Founder and executive characteristics and the probability of scaling

		(1)	(2)	(3)	(4)
		Growth-oriented	Rising superstar	Growth-oriented	Rising superstar
At least one serial founder		0.681***	1.129***	0.527***	0.857***
		(0.026)	(0.055)	(0.042)	(0.119)
	x EU	0.006	-0.220*	-0.032	-0.399
		(0.061)	(0.128)	(0.106)	(0.417)
At least one founder with a PhD degree		1.043***	1.131***	0.940***	0.691***
		(0.033)	(0.074)	(0.053)	(0.164)
	x EU	-0.534***	-0.321*	-0.676***	-0.345
		(0.084)	(0.184)	(0.142)	(0.546)
External CEO arrived before scaling				-0.251***	-0.110
				(0.045)	(0.127)
	x EU			-0.529***	-1.137**
				(0.125)	(0.534)
External CFO arrived before scaling				1.177***	1.954***
				(0.056)	(0.133)
	x EU			-0.538***	-0.516
				(0.169)	(0.536)
At least one female founder		-0.245***	-0.175**	-0.311***	-0.133
		(0.033)	(0.071)	(0.055)	(0.154)
	x EU	-0.082	-0.212	-0.051	-0.312
		(0.087)	(0.194)	(0.150)	(0.632)
At least one founder with a graduate degree		0.537***	0.673***	0.405***	0.238*
		(0.028)	(0.060)	(0.047)	(0.131)
	x EU	-0.117*	-0.064	-0.308***	-0.642
		(0.067)	(0.143)	(0.114)	(0.463)
EU		-0.688***	-0.523***	-0.440***	-0.665**
		(0.052)	(0.119)	(0.087)	(0.324)
Constant		-1.688***	-3.816***	-2.729***	-5.760***
		(0.054)	(0.133)	(0.088)	(0.315)
Cohort effect		Yes	Yes	Yes	Yes
Sector effect		Yes	Yes	Yes	Yes
External executive only sample		No	No	Yes	Yes
Observations		112,174	112,174	104,426	104,426
Chi-square stat		7,765	7,765	3,056	3,056

Note: This table shows the average marginal effects from the multinomial logit regression, analogous to Equation 2, with the dependent variable being the start-up's scaling outcome: innovative start-up (baseline), growth-oriented start-up, or rising superstar. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO); growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars; finally, innovative start-ups are companies that have filed at least one patent or received VC funding. The sample includes start-ups founded between 2000 and 2025. Control variables include a dummy identifying whether the start-up has one serial founder (vs. none) and a dummy variable for whether a founder has a PhD degree (vs. a lower-level degree), dummy variables indicating whether the start-up had a non-founder executive in the corresponding role (CEO or CFO) before reaching scale (vs after reaching scale), dummy variables of the founder's gender, and graduate education Control variables not shown in the figure include fixed effects for cohort and sector. Columns (1)–(2) report results for the full sample, including interactions with an EU indicator to capture differential effects between EU and US start-ups. Columns (3)–(4) only include those start-ups that have information on external. Robust standard errors are in parentheses; significance: *p<10%, **p<5%, ***p< 1%.
Source: OECD Start-ups Database, June 2025.

Table A A.3. Staggered DiD estimates: controlling for FUA-level variables

	(1)	(2)	(3)	(4)	(5)	(6)
	Newly founded start-ups		Newly founded patenting start-ups		Total amount of VC deals (in USD millions)	
	EU	US	EU	US	EU	US
Panel A: Rising superstars						
Average effect on the variable of interest after treatment	0.007 (0.078)	0.036 (0.043)	0.067 (0.099)	0.140** (0.061)	1.408*** (0.537)	0.507*** (0.214)
Test joint nullity of the effects (p-value)	0.127	0.533	0.291	0.161	0.090	0.161
Test joint nullity of the pre-trends (p-value)	0.012	0.973	0.166	0.772	0.419	0.367
Panel B: Growth-oriented						
Average effect on the variable of interest after treatment	0.157*** (0.049)	0.046** (0.018)	0.165** (0.083)	0.068** (0.030)	0.563*** (0.184)	0.467 (1.446)
Test joint nullity of the effects (p-value)	0.009	0.151	0.199	0.032	0.030	0.002
Test joint nullity of the pre-trends (p-value)	0.011	0.365	0.649	0.744	0.002	0.465

Note: This figure reports event-study estimates from staggered difference-in-differences, including FUA-level control variables, following de Chaisemartin and D'Haultfœuille (2024[64]). Control variables include total employment, GDP (as a percentage of national GDP), labour productivity (in USD), and measures of local research capacity constructed from Research Organization Registry (ROR) data. "Average effect after treatment" reports the average of post-treatment event-time coefficients. "Test joint nullity of the effects" reports the p-value of a joint test that all post-treatment coefficients are equal to zero. "Test joint nullity of the pre-trends" reports the p-value of a joint test that all pre-treatment coefficients are equal to zero. Panels A examine the effect of a Functional Urban Area's (FUA's) first rising superstar, while Panels B examine the effect of its first growth-oriented. "Treated FUAs" are those that have produced their first rising superstar or growth-oriented, while "not-yet-treated FUAs" are those that will do so in the future but have not yet reached their treatment year. The dependent variable is expressed as a percentage of its unconditional average. Thus, a positive value at event time t indicates that treated FUAs experienced a larger increase (or smaller decline) in the variable of interest relative to not-yet-treated FUAs. The treatment year corresponds to the first year in which an FUA hosts a rising superstar or a growth-oriented. Standard errors clustered at the FUA level are in parentheses; significance: *p<10%, **p<5%, ***p<1%.

Source: OECD Start-ups Database, June 2025; Schiavina et al. (2019[40]); OECD Data Explorer (2026[41]); Research Organization Registry (2026[42])

Table A A.4. Propensity score estimation

	(1)	(2)
	Rising superstar	Growth-oriented
Lag of total number of workers	-0.000	-0.000*
	(0.000)	(0.000)
Lag of GDP as % national value	0.031***	0.021**
	(0.007)	(0.009)
Lag of labour productivity	0.007**	0.015***
	(0.003)	(0.002)
Lag of total number of research institutions	0.009***	0.029***
	(0.001)	(0.002)
Located in the EU	-0.578***	-0.594***
	(0.131)	(0.100)
Observations	5,190	2,936
Pseudo R-squared	0.399	0.410

Note: This table shows the estimated coefficients from a probit model of the probability of producing a first rising superstar and a first growth-oriented. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. Control variables include total employment, GDP (as a percentage of national GDP), labour productivity (in USD), and measures of local research capacity constructed from Research Organization Registry (ROR) data, a dummy variable indicating whether the FUA is located in the EU (vs. in the US), and calendar year effects as predictors. Standard errors are in parentheses; significance: *p<10%, **p<5%, ***p<1%.

Source: OECD Start-ups Database, June 2025; Schiavina et al. (2019[40]); OECD Data Explorer (2026[41]); Research Organization Registry (2026[42]).

Table A A.5. Staggered DiD estimates: using a propensity score matched sample

	(1)	(2)	(3)	(4)	(5)	(6)
	Newly founded start-ups		Newly founded patenting start-ups		Total amount of VC deals (in USD millions)	
	EU	US	EU	US	EU	US
Panel A: Rising superstars						
Average effect on the variable of interest after treatment	-0.110 (0.075)	0.060 (0.0559)	-0.011 (0.065)	0.212** (0.100)	1.085*** (0.364)	0.590*** (0.209)
Test joint nullity of the effects (p-value)	0.052	0.314	0.693	0.055	0.028	0.023
Test joint nullity of the pre-trends (p-value)	0.023	0.202	0.095	0.029	0.160	0.246
Panel B: Growth-oriented						
Average effect on the variable of interest after treatment	0.070* (0.040)	0.053** (0.024)	0.087* (0.050)	0.160*** (0.049)	0.656* (0.355)	0.666*** (0.177)
Test joint nullity of the effects (p-value)	0.203	0.322	0.040	0.017	0.264	0.000
Test joint nullity of the pre-trends (p-value)	0.273	0.059	0.919	0.526	0.002	0.021

Note: This figure reports event-study estimates from staggered difference-in-differences following de Chaisemartin and D'Haultfœuille (2024[64]) conducted on a sample constructed using propensity score matching (PSM) and does not include covariates directly. Matching is performed prior to estimation to improve comparability between treated and never-treated FUAs. Rising superstars are start-ups with valuation ≥ USD 1 billion (private or at IPO) and growth-oriented are start-ups that have raised ≥ USD 50 million of funding but are not rising superstars. Control variables used in the matching stage include total employment, GDP (as a percentage of national GDP), labour productivity (in USD), and measures of local research capacity constructed from Research Organization Registry (ROR) data. "Average effect after treatment" reports the average of post-treatment event-time coefficients. "Test joint nullity of the effects" reports the p-value of a joint test that all post-treatment coefficients are equal to zero. "Test joint nullity of the pre-trends" reports the p-value of a joint test that all pre-treatment coefficients are equal to zero. Panels A examine the effect of a Functional Urban Area's (FUA's) first rising superstar, while Panels B examine the effect of its first growth-oriented. "Treated FUAs" are those that have produced their first rising superstar or growth-oriented, while "never-treated FUAs" have not. The dependent variable is expressed as a percentage of its unconditional average. Thus, a positive value at event time t indicates that treated FUAs experienced a larger increase (or smaller decline) in the variable of interest relative to not-yet-treated FUAs. The treatment year corresponds to the first year in which an FUA hosts a rising superstar or a growth-oriented. Standard errors clustered at the FUA level are in parentheses; significance: *p<10%, **p<5%, ***p<1%.

Source: OECD Start-ups Database, June 2025; Schiavina et al. (2019[40]); OECD Data Explorer (2026[41]); Research Organization Registry (2026[42]).